

Adaptation Within Constraints  
An Evolutionary Approach to Change in Individual and Social Constitutions

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## ACKNOWLEDGEMENTS

Epiphany is a strong word but it aptly describes my sentiments on first being exposed to Constitutional Economics. An impressionistic recollection of the two week seminar on Economic Philosophy co-taught by Professors Vanberg and Buchanan in 1990 would include cold February mornings, the musty atmosphere of the Public Choice Center library and a sort of heady intellectual stimulation that I had not experienced before.

Upon finishing my Master's thesis under Dr. Vanberg's tutelage, I joined the doctoral program in order to continue work in Constitutional Economics under his direction. But for his encouragement and help through the vicissitudes of the preliminary legs of this journey, this dissertation may never have been started. Dr. Vanberg's patience and gentle guidance from the initial process of defining this thesis through to its revisions and final refinements have eased this task. His intellect has been a steady source of inspiration. His encouragement and direction continued via the Internet after his transfer to Freiburg a year ago. The warmth and hospitality extended to me by Dr. Vanberg and his family on my two visits to Freiburg in pursuit of this thesis will long be remembered.

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## ABSTRACT

ADAPTATION WITHIN CONSTRAINTS; AN EVOLUTIONARY APPROACH TO CHANGE IN INDIVIDUAL AND SOCIAL CONSTITUTIONS Sujai J. Shivakumar, Ph.D. George Mason University, 1996 Dissertation Director: Dr. Viktor J. Vanberg

The past three decades have witnessed a revival of interest in the study of institutions by economists outside the disciplinary mainstream. Approaches in, what has become identified as, *New Institutional Economics* promote an understanding of social institutions as a complex of rules which, because of their reliability, recognizability, and general applicability, serve to reduce uncertainty and promote coordination and cooperation among individuals. The more recent tradition in *Constitutional Economics* has complemented and broadened this perspective by focusing attention on the constraints circumscribing adaptive change within and among rule complexes of various kinds. This thesis focuses on how such an integration is part of a broad framework that includes a particular theory of knowledge and behavior within an evolutionary perspective.

Our aim then is to show how the Institutional-Constitutional view can rest on a robust understanding of the knowledge and behavior of individuals. In particular, this thesis demonstrates that the proffered approach - built upon while at the same time reflecting the structure of arguments in evolutionary, behavioral, and epistemological theories - provides a theoretically compact and integrated explanation that can form a more sound basis for the study of social and economic phenomena.

## I. Introduction and Foundations

### A. *Adaptation Within Constraints*

#### 1. Proem

The past three decades have witnessed a revival of interest in the study of institutions by economists outside the disciplinary mainstream. Approaches in, what has become identified as, *New Institutional Economics* promote an understanding of social institutions as a complex of rules which, because of their reliability, recognizability, and general applicability, serve to reduce uncertainty and promote coordination and cooperation among individuals. The more recent tradition in *Constitutional Economics* has complemented and broadened this perspective by focusing attention on the constraints circumscribing adaptive change within and among rule complexes of various kinds. This thesis focuses on how such an integration is part of a broad framework that includes a particular theory of knowledge and behavior within an evolutionary perspective.

Our aim then is to show how the Institutional-Constitutional view can rest on a robust understanding of the knowledge and behavior of individuals. In particular, this

thesis demonstrates that the proffered approach - built upon while at the same time reflecting the structure of arguments in evolutionary, behavioral, and epistemological theories - provides a theoretically compact and integrated explanation that can form a more sound basis for the study of social and economic phenomena. More, the ingredients that constitute such a broad understanding can be interpreted from the writings of Friedrich Hayek.

What then are the elements of this explanation? The following sections of Part I-A take up its various aspects in turn. In answering what the nature of knowledge is, how a system or organism learns in solving the problems posed by its environment, and what conjectures are inherent in the constraints placed on this learning process, the preliminary stage will be set for appreciating issues of order and change in both the individual and social contexts. Following this profile, an overview of the rest of the dissertation is laid out

## **2. Knowledge and the Basis of Rationality**

Individuals can be said to cope with the complexity of their environment by categorizing encountered objects and effects in some manner considered relevant and hence by drawing upon such imposed rules and patterns. In this respect, growth of *knowledge* can be thought of both in terms of revising and developing new rules of classification as well as exploiting existing rules in attempting to solve perceived problems. As such, problem-solving has its *inductive* and *deductive* components.

However, while the dominant tradition in economics in the twentieth century has, with some success, exploited deductive logic in pursuit of solutions to theoretical problems, a realization of the limits of that approach has led to renewed interest in what puts the *rational* in *rational choice*.

#### **a. Dealing with Complexity**

The extension of knowledge in neoclassical analysis, in its presumption of the deductive approach, is limited in two respects. First, one can consider that even given that individuals possess knowledge of the functional relationships that characterize their environment, their inherent cognitive limitations precludes them from determining what the values of the variables in those functions are. Secondly, one can consider as well that individuals deal with the complexity in their environment by forming conjectures regarding the relationships thought to be relevant and that deductions and conclusions drawn from these conjectures are limited by how appropriate such drawn inferences are.

While consideration of the inductive approach in economics has long roots, going back at least to David Hume, a revival of interest in such an approach has been fostered

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by recent developments by psychologists such as Holland and others. W. Brian Arthur's article in the *AEA Papers and Proceedings* (1994) reflects this attention. Noting that economists are well aware of the limitations created by the type of rationality assumed in

traditional economics, Arthur points to induction as a way of dealing with complexity in economic theory. He states that

[i]n problems of complication then, we look for patterns; and we simplify the problem by using these to construct temporary internal models or hypotheses or *schemata* to work with. We carry our localized deductions based on our current hypotheses and act on them. As feedback from the environment comes in, we may strengthen or weaken our beliefs in our current hypotheses, discarding some when they cease to perform, and replacing them as needed with new ones (406).

Arthur further declares that such an approach, rather than being antithetical to reason, is indeed the way in which science and knowledge progresses. He concludes therefore that if economic analysis is to do more than scratch the surface of the complex decision problems that agents must face, a study of how individuals build and reform belief\* models must be instigated.

#### **b. The Problem of Knowledge**

The problem of knowledge is one of how an individual gauges the relevance of induced rules and derivations thereof that enable him or her to adapt more successfully to his or her surroundings . One's rationality, then, is vested in the use of such rules in

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See: *Induction - Processes of Inference, Learning, and Discovery* by Holland, John H., Holyoak, Keith J., Nisbett, Richard E., and Thagrad, Paul R. We more thoroughly consider this contribution in the context of our discussions in Part II-B-3

2

The problem of knowledge is one of classifying phenomena in some relevant way, avers Hayek in *The Facts of the Social Sciences*. As to relevance, he notes that "what makes a number of individual things facts of a kind are the attributes which we select in order to treat them as members of a class. This is, of

interpreting observed events and in extending cognitive models in a consistent manner.

Such rules that govern the extension of knowledge may be strengthened or discarded

based on the successes or failures that we may experience as a consequence of their use.

Thus, rather than recognizing the existence of some fixed ultimate reality that is to be revealed, this viewpoint holds that each person sets up a set of provisional rules for dealing with his or her environment and proceeds to refine them with reference to a judgment of their adaptive usefulness.

Such rules can be personal or social in character, where social rules can be thought of as fostering a uniformity of various aspects of behavior, outlook, and expectations across **nqii** anticipate the actions of the other in turn leads to improved coordination and cooperation among rule subscribers and can enhance the adaptive success of each. In *The Use of Knowledge in Society*, Hayek notes that a more complete exploitation of the "knowledge of time and space," where each individual has a specialized knowledge of particular circumstances superior to others, can be realized only through decentralized institutions of cooperation (1948 [1945], 80). Correspondingly, the problem of knowledge in society becomes one of how to develop and modify these rules and institutions such that they remain relevant while maintaining the cohesion that they bring about.

Hayek avers that the nature of how knowledge is acquired is rather different from the assumptions of the neoclassical approach:

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course, commonplace. But it means that, though all the social phenomena with which we can possibly deal

transmission A  
learning by  
categories used  
in paragraphs

But the assumptions or hypotheses, which we have to introduce when we want to explain the social processes, concern the relation of thought of an individual to an outside world, the question of to what extent and how this knowledge corresponds to the external facts. And the hypotheses must necessarily run in terms of assertions about causal connection, about how experience creates knowledge (1948 [1937], 47).

He goes on to note that we must select from a variety of hypotheses based on which ones are particularly relevant to conditions we face. In his essay *Economics and Knowledge*, he concludes that

there is something fundamentally wrong with an approach which habitually disregards an essential part of the phenomena with which we have to deal: The unavoidable imperfection **of man's knowledge** and the consequent need for a process by which knowledge is constantly communicated and acquired. Any approach, such as that of much of mathematical economics with its simultaneous equations, which in effect starts from the assumption that people's *knowledge* corresponds to objective facts of the situation, systematically leaves out what is our main task to explain (1948 [1945], 91).

### 3. Evolutionary Epistemology

Arthur's recommendation for the future direction of economics and, moreover, Hayek's approach to the *knowledge problem* point to a theory of learning that refers to a competition among hypothesis. Agents are seen to select from amongst alternatives that, upon some basis of judgment, seek to solve the problems perceived in the environment.

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may have physical attributes, they need not be physical facts for our purpose. That depends on how we shall find it convenient to classify them for the discussion of our problems" (1948 [1942], 59).

Such an approach to problem-solving is core to the research, program of *evolutionary epistemology*. Its characteristics are drawn out below:

**a. The Darwinian Evolutionary Perspective**

The theory of evolution through Natural Selection, as first fully articulated by Charles Darwin in a biological context, is core to the understanding of evolutionary epistemology. The Darwinian system deals with a process by which novelty or variation is generated, a process by which the innovation is selected based on some standard, and a process by which such changes are preserved, reproduced or propagated. In this way, the alterations produced in the features and capacities within the system enable an increase in its *adaptive fit* with respect to solving the problems posed by the environment.

The *population thinking* perspective is key to interpreting Darwinian evolutionism. As explicated by Ernst Mayr, this insight stresses the uniqueness of the individual over its type: "The differences between biological individuals are real, while the mean values we may calculate in comparison of groups of individuals (species for example) are man made inferences" (Mayr, 1982, 47). Thus what we may take to be a "type" consists of a recognition of a distribution of particular characteristics within a population of distinct units. Such individuals, in dealing with their problem environment may generate novelties in their form or behavior that may prove to provide a better adaptive fit. As such alterations are imitated or otherwise propagated within the population, the distribution will change, reflecting the increased prevalence of new

features and capacities that deal more successfully with the problem environment. In time, such changes in type may come to become recognized or categorized as distinct from the original array of characteristics as taken at an earlier point in time. In this way, given that the problem environment itself does not change, the system can be said to 'shift' to form an adaptive fit.

### b. Problem-Solving and Evolutionary Learning

The evolutionary processes by which an organism solves the problems posed by its environment can be considered to operate in the same manner at all levels of learning and among all organisms. As Popper has noted, learning takes place "by the method of trial and error: new relations, new forms, new organs, new modes of behavior, new hypotheses, are tentatively put forward and controlled by error elimination" (1972, 242).

Such, trial and error processes also characterize the "correction and modification of previous knowledge"(Ibid., 259). This mode of evolutionary problem-solving at the level of species can be extended to the process of learning; the same scheme, then applies equally to the development of new forms among living organisms and their behavior as to the emergence of new scientific theories (*Ibid.*, 288). As in Popper's well-quoted phrase, the growth of knowledge through the proposition and elimination of tentative solutions is the same from "amoeba to Einstein"(Ibid., 261). All amendments to knowledge can be considered to take place through trial and error process, at levels variously from inborn dispositions to learned rules and behaviors.

### c. Classifications, Conjectures and Rules

We have seen that learning is an evolutionary process by which modifications to existing knowledge are made through a process of trial and error. As we have also noted, knowledge is based on classification of the problem situation into categories that are considered to possess certain characteristics of relevance in common. Thus, learning, or modifications to knowledge, is affected through a process of reclassification, either within the scope of the current frame of reference or via a modification of that frame itself, to form a more adaptive fit.

The judgment of what characteristics are deemed to be of relevance represents a conjecture as to what features of a situation are to be taken particular notice of. In turn, the identification of such features with the significance of the classification they foster then form the basis of rules. To render this distinction concrete, consider the statement "red apples are sweet." The rule is based on an observation of the flavor properties of apples of various colors with the resulting classification resting on the characteristics associated with the feature of interest.

These considerations in turn give rise to an inquiry as to the context within which rules are revised. If, as Hayek has noted, an organism's perception of the world is theory-guided and presupposes the existence of knowledge accumulated through species as well as individual learning (1952, 167), classification can be thought to take place at such various levels. More, from the base sensory level to the plane of abstract theorizing, such systems of classification are conjectural. Accordingly, reclassification at a given level can

be considered to be induced when the expectations fostered by the existing classification prove disappointing in some respect or are disproved by experience.

The generalized model of learning that evolutionary epistemology represents, thus forms a framework for theoretical integration that covers biological evolution, individual learning and cultural tag. In providing a systematic account of change and learning, this account founds a deeper appreciation of how individuals deal with complexity. It is held that this junction of inductive and evolutionary approaches thus provides a more secure foundation for the studio of social and economic phenomena.

#### 4. Subjective Order and Conditioned Change

How can an alternate account that is part of a broader perspective, including concepts of human knowledge and behavior, and that explains the emergence, existence and change of social institutions, be formulated? Such a candidate must begin with a conception of *order* consistent with the considerations of *evolutionary epistemology*.

The notion of *population thinking*, which we have previewed, offers insights into the mechanisms of change within a subjectively perceived order. As we noted, Ernst Mayr holds that the comparison between species, as groups of individuals bearing certain characteristics in common, is based on "man-made inferences" and that the "difference between biological individuals are real" (1982, 47). This emphasizes that it is human perception that imposes order and that change in such orders is driven at the individual level rather than at the plane of such abstractions; a subjective theory of order requires

that change be explained in terms of alterations in the individual components of the order. In turn, this emphasizes the subjective interpretations of order.

We have made the point that individuals infer patterns in their environment in order to better adapt to their surroundings. Our knowledge is accordingly based on capitalizing on rules and the configurations of rules that make up such inferences. This is the basis of rationality. We may extend the rules that underlie our knowledge through the extension of such inferences to new situations. Here, these may be validated or rejected on the successes or failures consequently experienced. Accordingly, conceptions of order change through the alterations among rules or the configurations that bind them. Since each individual has a unique set of experiences, his or her perception of order will vary. As a result, each will value various things differently as each develops his or her idiosyncratic knowledge through time and experience.

In considering the evolution of an order on the basis of rules or configurations that characterize it, we must distinguish between *conditional* and *unconditional* evolutionary claims. The Constitutional perspective considers an order as consisting of a configuration of rules. This can be thought of in terms of a hierarchy of rules with nodes at each level setting the context and scope within which, at subordinate levels of rules, change can occur. Such nodes are themselves considered to be subject to constraints prescribed by higher levels of rules. In other words, the terms of change at a particular level is based on competition among alternatives conditioned upon *conjectures* regarding what may be considered to be a more fruitful approach. The basis for such conjectures are in turn

conditioned in competition as they are governed by still more fundamental bases. Thus, while for *unconditional claims*, no substantive conclusion can be drawn as to what survives, *conditional claims* specify the commitments and constraints in terms of the competition within which the alternatives are to be selected.

## **5. Evolutionary Adaptation in Individual and Social Constitutions**

Given subjective notions of order and of change within constraints, this dissertation attempts to provide an understanding, within an evolutionary context, of how adaptation within frameworks for Individual and Social Constitutions are conditioned and how they change. In doing so, I hope to show the similarities and the complementarities between the two systems.

### **a. Individual Constitutions**

Beginning with Individual Constitutions, consider that rules contained in cognitive models direct the attention and innovative efforts of the individual in some directions while discouraging the same in others. Rules thus provide the framework within which our knowledge can extend. That is to say, they provide the basis for the selection of novelty in behavioral repertoires in determining which habits, routines and dispositions are encouraged and extended or discouraged. Competition among such cognitive frameworks thus constitutes an explorative learning process where alternate ways of coming to grips with a range of experienced problems are tested and adopted.

This is based on the determination of what enhances the adaptive well-being of individuals given the cognitive limitations of each. This judgment of what constitutes an enhancement of adaptability is, in turn, driven by more fundamental levels within the mental framework.

*i. Psychological Theories of Behavior*

Of course, how we go about making sense of our environment has been the source of long-standing debate in philosophical circles. It can be traced back to the debates between the Empirical School, which argued that our ideas all come from experience, and the Rationalist School, which argued that many aspects of our knowledge are based on innately given characteristics of the human mind. This debate has been carried into the present by the two camps in behavioral psychology.

While Behaviorism understands the notion of categories as stimuli that evoke similar responses, Cognitivist approaches maintain that concepts exist *a priori*, waiting for our minds to discover them. Concepts are held to be the building blocks of knowledge representation, *that* notion of the world by which an intelligence is able to understand some aspect of the world. The shift in paradigms in psychology from Behaviorism to Cognitivism was taking place as computers were coming of age in the 1950's and 60's. Computers provided the machine metaphor wherein researchers pondered if the nervous system, in being adapted to represent and symbolically transfer the world of the organism, was not unlike an information processing machine. Indeed, Herbert Simon, a pioneer in Artificial Intelligence and Cognitive psychology, has noted

that individuals deal with the complexity of their environment by breaking it down into interrelated subsystems which form a part of the cognitive hierarchy. Human problem solving then is considered to operate at the level of these subsystems where they are tested for relevancy without upsetting the overall architecture.

While Cognitivists have built a strong case for understanding human action based on mental representations of the world, Behaviorists' contributions continue to be of relevance such as in posing that the evolution of behavior is affected through social reinforcement and conditioning. Their approach spotlights, among other things, that social evolution is propelled at the individual level through contingencies generated at the level of social rules and that an individual's behavior is transformed at the level of particular behavioral rules and actions. It would seem that a happy synthesis of the two approaches would consider extensions to mental paradigms as subject to various governing contingencies. Indeed, recent investigations in psychology by Holland *et al* (1989) have considered the cognitive system as constructed from rules and organized into default hierarchies. More, they have noted, assembling a model of the current situation may be thought in terms of a competition among a range of models for the right to represent the environment.

Thus, the dynamics of the individual constitution might be thought of in terms of a competition among mental models within a framework of higher and relatively more permanent levels of mental models. Further, these models are considered as themselves conditioned by successively more fundamental competitive orders of rules. In short,

there is considered to be relative levels of predispositions which condition the path of knowledge acquisition. At the same time, it is recognized that that these predispositions are themselves subject to evaluation by the failure or success of the individual's ability to adapt, using the knowledge generated within such frameworks.

ii. *Hayek's Sensory Order*

Hayek's investigations in theoretical psychology, contained in *The Sensory Order*, begun in 1922, offer remarkable and prescient insights into the architecture of institutions of thought. They anticipate the development of contributions in Cognitive psychology by about four decades and, more, incorporate the notion of competition among mental rule groups that has been put forth recently, as we have noted, by Holland and others. Hayek conceives of the mind as an order that attempts to reflect, though not with perfect success, the salient features of the physical world thereby enabling the organism to adapt to its surroundings. In attempting to reflect on the physical world, the mind is seen to be guided by perceptive predispositions, built up over the course of its biological and behavioral evolution. Sensory perception is considered an act of classification, an interpretive placing of something within the context of an order so derived. The order which the linkages create in the central nervous system is seen to constitute an imperfect and perhaps erroneous *map* of the relations which exist between corresponding stimuli. These maps are subject to continuous though gradual change. How change is effected within these maps, however, has to be described in terms of their structure.

Hayek's conception of mental architecture is strikingly similar to the one that is proffered in that it contemplates changes in discerned order through alterations in the relative levels of rules that guide perception; competing alternatives at each level are evaluated in terms of their conjectured usefulness in enabling the individual to adapt to his or her environment. Hayek notes that "the experience that the classification based on past linkages does not always work forces us to revise that classification. In the course of the process of reclassification, we not only establish new relations between data given within a fixed framework of reference, i.e., between the elements of given classes: but since the framework consists of the relationship determining the classes, we are led to adjust the framework itself (168, 1952). As we shall see, such an understanding leads directly to a grasp of the evolution of social institutions where competition at each level is conditioned by the rule level above.

#### **b. Social Constitutions**

We have already considered that *the population thinking* approach leads us to consider order as based on "man-made inferences" and that changes in that order have to be considered in terms of the components of that order. In the case of Individual Constitutions, we noted that the order that individuals perceive can be understood in terms of a hierarchy of competing levels of cognitive rules. Similarly, in the case of Social Constitutions, the order that analysts perceive can be understood in terms of such a rule hierarchy.

First, however, we must ask ourselves what the features of such an order are. Economists, who have turned their attentions to understanding the roles that institutions play in a community, identify certain common themes. These themes, which have been recognized as the core of the research program of *New Institutional Economics*, locate the role of social institutions in reducing uncertainty and promoting coordination and cooperation among individuals. Social institutions are considered to be made up of rules or complexes of rules which, if reliable and well recognized, can serve as a nexus of mutually beneficial social activity. By limiting what is recognized into consideration and in specifying how it is to be appraised, such rules are seen to help individuals to predict and exploit their environment. Given this, order based on an institutional structure can emerge. Patterns in such an order may in turn be discerned and serve to found a subsidiary social order.

As we have noted, Social Constitutions can be thought of as being structured in terms of a hierarchy of conditioning rules. Accordingly, just as in our appraisal of the Individual case, the dynamics of a Social constitution can be thought of in terms of a competition among rules or complexes of rules within a framework of higher and relatively more fundamental levels of rules. Such rules would be considered as themselves governed by successively more encompassing levels of rules and rule competition. The nature of such competition determines how orderly and predictable changes in the rules are and reflect on how well a social institution may serve its purpose.

In this regard, we may again recall the distinction made earlier between conditional and unconditional evolutionary claims.

Such an understanding of the evolutionary development of institutions is consistent with the form of the model employed by Hayek in considering changes in the sensory order. It is also consistent with his Theory of Cultural Evolution, though as reinterpreted by Vanberg. Hayek's theory of cultural evolution poses in the main that since we cannot *ex ante* know what solution will prove adaptively efficient, we can learn to cope better by proposing tentative conjectures subject to selection in a competitive environment. In invoking the analogy of rules as tools, Hayek tried to point out that rules form and spread just as tools do - through the innovation of alternate modes and the imitation of successful practices. Yet he stepped beyond the bounds of this comparison when he evoked group selection as the means by which the institutional characteristics of groups are tested against each other.

The issue, then, that requires clarification in the discussion of cultural evolution is not whether competition at the group level occurs, but within what context. In short, we may ask what the rules are for competition among groups, what such rules are conditioned upon, and what may be inferred about the desirability of outcomes generated under alternative competitive constraints. As Vanberg has noted,

[t]he basic thrust of such a conditional notion of cultural evolution is described by the idea of a process that allows, at all levels at which rules or institutions emerge or are chosen, for alternatives to be tried out, and to be exposed to a kind of

competition that makes for responsiveness to the interests of the individual persons who are to live under these rules( 1994a, 189f).

This reinterpretation of Hayekian evolutionism envisions a clearly defined role for constitutional choice and institutional construction to provide the framework within which innovative and competitive activities can play out to the adaptive benefit of the constituent individuals.

## 6. Plan of Exposition

This dissertation attempts to promote, within a thoroughgoing evolutionary perspective, an understanding of a theory of institutions that is consistent with a theory of human behavior and knowledge. Such an approach, it is held, provides a unified structure to the study of social phenomena. The task is broken down as follows:

Following this section, the remainder of Part I sets out the methodological constraints that condition our efforts. In this light, we examine the meaning of such terms as Methodological Individualism, Subjectivism, and Normative Individualism. Also given that the enterprise of Constitutional Economics, with which this effort is identified, may be unfamiliar to some readers, we lay out the basis for this particular program of study.

Part II begins our account of how a particular theory of structure and modification in human behavior and knowledge can lead to an understanding of order and the mechanisms of change in society. Section A looks at order and change from the biological point of view, with particular reference to the *population thinking*

interpretation of Darwinian evolutionism. Section B then studies the issues of order and change in Behaviorist and Cognitivist approaches to human behavior. In applying the constitutional perspective to the lessons from biological evolution, we arrive at a synthesis that considers competition at various levels f thought as conditioned by the various contingencies of reinforcement. Such an approach is found to be consistent with recent developments in psychology. Section C then shows that the ingredients of such a broad outlook can be found in Hayek's *Sensory Order*. Finally, Section D evaluates the economic interpretations by various authors of theories of evolution, behavior and knowledge. It shows, for example, that attempts to graft a Darwinian account of evolution into equilibrium economics cannot succeed.

Having formed a consistent and coherent vision of order and change in Individual Constitutions, we apply this perspective to illuminate the issues of order and change in the context of Social Constitutions. Section A of Part III explores the nature of social institutions while Section B applies the adaptation within constraints insight to the issue of institutional change. In particular, we note how a reinterpretation of Hayek's version of cultural evolution proves consistent with his earlier investigations in theoretical psychology. The next three sections provide new intuitions through illustrations of order and change within various social institutional settings: Section C examines the issue of order and change in markets, Section D looks a new at the issue of change in scientific paradigms, while Section E gauges how the adaptive alternatives of the constituents of a

### *B. Constitutional Constraints*

Constitutional Economics (or more formally Constitutional Political Economy) emerged as one of two strands of Public Choice Economics, pioneered and championed by the Nobel Laureate James M. Buchanan. While one strand deals with such topics as voting rule analytics, the other, to which we here turn, is concerned with choice among rules. Through the insights that its perspective has afforded over the past decade, it has gained legitimacy as an ongoing research program.

Given that the field of Constitutional Economics is relatively new, this section aims to provide an overview of its fundamental postulates as interpreted by this author. The concern will be to lay out the constraints, the constitution if you will, within which discourse in Constitutional Economics is undertaken rather than to attempt an exhaustive survey. The task, as taken, is divided as follows: the current part reviews the founding premises of the discipline while the next, part (2), attempts to clarify the notion of *choice within constraints that* is central to its domain.

## 1. Methodological Starting Points

### a. Methodological Individualism

Individualism demands that the analysis of any perceived order be carried out in terms of its elements with respect to the constraints they are placed under. The bedrock notion of Constitutional Economics, as an enterprise in Social Science, is that the choice calculus is located within individual persons; "The autonomous individual is a *sine qua non* for any initiation of serious inquiry into the research program" (Buchanan 1990, 13). This is not to say, however, that individuals choose in a vacuum. The community that the individual lives in or shares an association with may influence the way in which his or her values are formed. Indeed, once the analytical starting point of the autonomous choosing individual is accepted, examination can be directed into how the community that is organized or that can potentially be organized, adjusts within the chosen rules. However, the initial contention of methodological individualism lies beyond bounds of analytical debate

Consider, therefore, as a starting point that the individual *is* conceptually separable from the community and that collective action *can* be derived from individual evaluations.

### **b. Catallactics**

The Constitutional Economics research program reveals its ties with the Austrian tradition in economics in its consideration of the *market order* as a pattern recognized from the spontaneously formed separate choices of individuals acting and interacting within legal and other rule constraints . The contrast between the activities of such individuals and the pattern they create is reflected in Hayek's distinction between the term *economy* and what he calls a *catallaxy*. He considers the former, in confining it to its original context, as consisting "of a complex of activities by which a given set of means is allocated in accordance with a unitary plan among the competing ends according to their relative importance" (Hayek 1973, 107). In contrast, the latter is considered as a network of relationships that make up the market order. As such, it is seen to serve no particular rationale. The term, Catallaxy captures the idea of an "order brought about by the mutual adjustment of many individual economies in a market. [It is thus] a kind of spontaneous order produced by the market through people acting within the rules of property, tort, and contract" (*Ibid.*, 109).

If so, we may conclude that the extent of such a market order would depend on how such rules condition the way in which individuals may interact and form mutually beneficial relationships. Thus the notion of catallaxy brings into focus the importance of social institutions as an interconnection of abstract rules in enabling each individual to exploit his or her own peculiar skill and knowledge for his or her own ends *vis à vis* those

of others' and their ends. Accordingly, the chief common purpose of the members of such a means-connected society "is the purely instrumental one of securing the formation of an abstract order which has no specific purposes but will enhance for all the prospects of achieving their respective purposes"(72>M ,110).

### c. Subjectivism

Individuals impose patterns on their environment in order to better predict it, exploit it, and thus adapt to it. Our *knowledge* is accordingly based on capitalizing on a rule or configuration of rules that, directly or indirectly, enables us to adapt more successfully to our surroundings. We may extend our knowledge through the use of our *rationality* in playing out critical *choices* among starting points through a systematic interpretation of rules. Such choices are creative in origin. The rules that govern the extension of knowledge are strengthened or discarded based on the successes or failures that we may consequently experience. Since each individual has unique experiences and may adopt differing nodal starting points or choices, the rules and configurations thereof that each forms and the interpretations that they engender will differ from person to person. Each will value things differently as each develops his or her idiosyncratic knowledge through the refinement of his or her knowledge base.

Knowledge can be extended via the rational extension of cognitive models as well as through the modification of rules of rationality. For the first, as Shackle notes,

"Reason unfolds the meaning of the premises. It can do no more"(1992, 25). With respect to the other, we have to reflect on how mental models entertain diverse and competing hypotheses.

In this paper, we consider such models as vested in a hierarchy of mental rules with nodes at each level setting the context within which choices may be considered and compared. Here, at each stage, higher rule levels may themselves be considered to be one of several alternatives, existing or potential, which may be reevaluated. Our subjective judgments on how to evaluate a certain set of outcomes with respect to their adaptive uses or potential is based on various levels of presiding rules, each conditioning the terms and, through categorization, the alternatives or competitors. In turn, each is subject to evaluation if the outcome of the competition engendered is deemed unsuccessful at some more fundamental level of thought. Such an approach is consistent with Hayek's epistemological views as expressed in *The Sensory Order* (1952) and the more recent insights in psychology by Holland et al (1986).

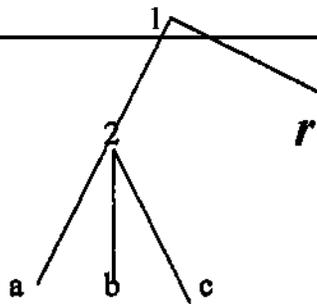
As an example, consider a possible extension of neoclassical economic theory permitted within the methodological guidelines of, say, a certain mid-western school. If the result appears alien to one's common sense and experience, one may try other approaches within the same guidelines. If one remains dissatisfied, one may attempt to proceed under a variation of the neoclassical framework promulgated by a different school. Alternatively, one may try to come up with some guidelines of one's own within the neoclassical framework and attempt to proceed on that basis. If one continues to feel

dissatisfied, one may then question what had until then been accepted as given, *i.e.* the neoclassical guidelines. One then may experiment with available or imagined alternatives to neoclassicism in examining the methodological variants that they may sponsor.

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The terms under which competition at a given level is based or conditioned upon conjectures regarding what is considered to be a more fruitful approach. The basis for such conjectures is in turn in competition with others, with this competition, further, governed by more fundamental bases. Such higher levels of rules, though, may be considered as 'given' when considering the alternatives at the immediate level of concern.

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With reference to the diagram, consider a competition between a and b, conditioned by rule 2. If both alternatives are unsatisfactory, alternative c may be imagined. If rule 2 is considered to be unsatisfactory on the basis of consideration at the rule 1 level as to the alternatives it fosters, 2' may be considered in comparison to 2. And so on.

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Figure 1: Competition Conditioned at Various Levels

As such the process of adjustment and the advance of knowledge inherent may rest in finding an alternative within the current concept of a methodology or in revising the methodology itself.

The themes of strategies within and among rule levels, of relative levels of rules, and the constraints within which rules may develop, introduced here with respect to subjectivism, are taken up in turn in part C of this section. Indeed, it is our core notion that order and change within individual and social constitutions can be thought to proceed on the basis of such an understanding.

#### **d. Normative Individualism**

Normative Individualism, a meta-theoretical principle, attempts to judge the goodness of socio-economic situations through the evaluations of the relevant individuals (Vanberg 1986a, 114); considering individuals as sovereigns in matters of such choice is taken as the foundation for a liberal social order. "In accordance with this premise, the legitimacy of social-organizational structures is to be judged against the voluntary agreement of those who live or are living under the arrangements that are to be judged"(Buchanan 1991, 227).

If one can agree that individuals are sovereigns, then we can attempt to work out a comparison of types of arrangements. The social choice approach promulgated by Arrow (1951) attempts to address how alternative social orderings can be consistently derived from individual orderings. Harsanyi's (1977) utilitarianism attempts to answer the

question of how welfare functions can be derived from individual utilities. In these two approaches, individual utility is gathered as an input by the analyst who then generates an output decision at a social level that best expresses individual preferences. In these approaches however, the individual is not the evaluator of the outcome. The subjectivist contractarian approach, on the other hand, is driven by individual choice. Here the decision is expressed and revealed as the result of a confrontation of choice. The focus accordingly then turns to the context within which such choice is presented; what rules for interaction individuals can agree on.

What may the analyst take as an indication of individuals' evaluation of social conditions? In the case of *market* transaction, the *goodness* is established by virtue of the individual's voluntary participation in the exchange. In order to qualify as voluntary, such participation must be within rules drawn by legislation and should be marked by an absence of coercion and fraud and the imposition of negative externalities upon third parties. A second type of relation subject to individual level evaluation is the on-going relationship inherent in a *corporate* structure. This order is characterized by an inclusive multilateral exchange such as that within a family, club, firm, or political unit. In these situations, individuals choose to submit to certain constraints in exchange for benefits which they could not otherwise realize. Coercive action, in this context, can be viewed as mutually agreed upon, self-inflicted constraint, enforced by establishing contingencies of reinforcement.

While the terms by which evaluation of goodness in the market situation is expressed are relatively easy to monitor, it can be less clear in the corporate case. The challenge then is to consider social arrangements within which such evaluations can be more easily made and acted upon and which in turn make such arrangements more responsive.

## **2. What is Constitutional Economics?**

As we have noted, Constitutional Economics distinguishes itself from ordinary economics in that it considers choice *among* rather than within constraints. In the usual text-book treatment of the subject, some constraint, a budget for example, is imposed exogenously. The chooser then, given his or her utility function, is considered to set about maximizing it within these established bounds. Such bounds, as established variously by past events, choices, institutional arrangements, and the like, are taken as given. In contrast, "Constitutional economics directs analytical attention to *choice among constraints*"<sup>1</sup> (Buchanan, 1990, 3).

### **a. Strategic Precommitment**

The Constitutional perspective sees individuals as capable of choosing to impose constraints or limits on their own behavior, primarily as a part of an exchange in which restrictions on their own actions are sacrificed in return for the benefits that are anticipated from the reciprocally extended restrictions. For example, if Adam and Eve are able to make credible commitments not to attack each other physically, then each may benefit in not having to be on constant alert as to the threat posed by the other. This in turn frees each to pursue things of value to each. The derivation of institutional constraints is thus based on a calculus of individual interests within the context of an exchange paradigm. As such, emphasis is placed on the selection of rules and institutions that place limits on the behavior of those that operate within them.

The notion of strategically placing limits on our future behavior applies equally well to the precommitment of one's own behavior in a personal sphere as it does in a social context. Indeed, the economics of self-control is an integral part of the domain of Constitutional Economics<sup>3</sup> and where setting an alarm clock to wake up at an early hour is but one quotidian example of personal precommitment. Indeed, the logo on the cover of *Constitutional Political Economy*, this discipline's journal, depicts Ulysses tied to the mast in order to forestall being drawn by the songs of the Sirens. In the social context, such precommitment must be founded on the actions of society's individuals proceeding on a multilateral basis: "Each agrees to a set of rules and procedures because this is the price each must pay to restrict the conduct of others"(Brennan and Kliemt, 1990, 125). Such rule following enables each to better predict the actions of others and thus to plan on this basis.

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<sup>3</sup> The economics of self-control, coined *egonomics* by Schelling (1978), is pursued in section II-B.

Rule-following, in a social context, can be divided into Coordination rules and Cooperation rules. Coordination rules, such as following rules of the road, present the case where the benefits of the others' rule following depends on our following complementary rules. Here, it is in the interests of both parties to follow a rule. There also exists the contingency where the benefits of the other's rule commitment is independent of one's own. How can we get all parties to cooperate in this case? The most attractive alternative is to bind other to rules while one is not so confined. One may however not have the power to force this option. Joint commitment to rule following through exchange of commitments may be attractive to each participant if the cost to each in being so bound is less than the benefits that can be gained by others being likewise bound. Shared constitutional interests can thus be realized through strategic rule precommitment.

How might such an order emerge? Buchanan, in *The Limits Of Liberty* (1975), contemplates this question. He notes that in a natural state, each person expends resources to fend off against attack by other persons. Each would be better off if such resources could be directed to production of valued items. By negotiating an agreement, characterized by enforceable precommitments to limit defense and predation, law emerges with each person accepting limits to his or her own freedom of action and liberty. Equipped with a set of such rights and informed about them and the rights of others, the individual is in a position to initiate subsequent agreements with other persons. Once

individual rights are well defined, non-arbitrary, recognized by the participants, and enforced, economic interchange can proceed within such a framework.

#### **b. Constitutional Frameworks**

We have noted that a market order proceeds within an institutional framework where such frameworks are based on a credible exchange of commitments. Order is generated through the framework's structure in that it enables the individual to recognize patterns, predict them, and exploit them. At the same time, such frameworks limit the range of what is taken into consideration and how it is appraised.

This distinction between the institutional structure and resultant order has been raised by Hayek and Lachmann. Hayek refers to a *cosmos* or spontaneous order which is not limited to the degree of complexity that the human mind can contemplate. As Hayek notes, "[a]ll that is necessary to preserve such an abstract order is that a certain structure of relationships be maintained, or that elements of a certain kind (but variable in number) continue to be related in a certain manner" (1973, 39). This *structure of relationships* enables the formation of a degree of complexity in arrangements that could never be deliberately accomplished, and makes use of knowledge that no individual possesses as a **whole** (Aid!, 49).

For Lachmann (1971), institutions provide the nexus for millions of individual purposes and plans. Constitutional frameworks, representing such social institutions, are

thus to be considered as social capital. Lachmann further distinguishes between *external* institutions, which make up the outer legal framework and *internal* institutions which evolve and develop through the course of market processes.

We have implicitly introduced here three separate but interwoven notions: that of strategies within rules, that of various levels of rules and institutions, and that of how the framework affects the formation of any resultant order. We briefly consider these in turn.

i. *Strategies Within and Among Rules*

The notion of strategic choices within as opposed to among rules can be best considered in analogy to a game such as poker. In any observed and ongoing poker game, players abide by the adopted rules that exist and define the game. Players adapt strategies in attempts to win within the framework of the game's rules. At the same time, persons may evaluate these rules and may enter into side discussions about possible rule changes in an attempt to improve the game as they see it. If an agreement is reached as a consequence of such discussions, the rule revisions may be adopted and the regime shifts.

This poker game analogy illustrates, first, the distinction between choice of strategy within existing sets of rules and choices among alternative sets of rule structures, i.e. between constitutional and sub-constitutional choice. Second, the example allows us to see that the individual as a player may behave responsibly and rationally in choosing and implementing strategies within rules that define the game without necessarily concerning himself or herself about changes in the rules themselves. Similarly, participation in choosing among potential rules, though optional, must be made within the context of a set of meta-rules.

As with any simple analogy, this one may be misleading in respects. First, unlike in its small setting, games with large numbers of participants may provide little or no incentives for the single player to participate actively in a serious reevaluation of the rules. In large number settings, the individual player may not consider himself or herself influential in mooting, or controlling the selection from among, alternative rules. Second, a disaffected player may fold his cards and walk away from the game. Exit from political regimes are typically a considerably more expensive proposition. As a result of these two conditions, an erosion of constitutional responsibility may occur. (Buchanan 1989,26-29).

*ii. Relative Levels of Rules and Constraints*

The notion of a structure of relationships and the spontaneous orders that develop within its interstices is limited in that it contemplates, at a given time, only two levels of arrangements. A more general approach would incorporate the outlook that such structures or paradigms are nested within other structures, with each higher level reflecting a more fundamental and comprehensive distinction on how we choose to view the world. In this account, at each level of choice, the rules that define choice are considered to be *relatively absolute absolutes*, to use Buchanan's pet phrase (1989). Thus, one may distinguish choices made from *among* constraints with those choices made *within* constraints, where such constraints are taken for granted. Correspondingly, and at each level, Constitutional choice is more comprehensive than sub or within-constitutional choices.

This concept of relative givens applies to individual choice as well as to social choice. For the individual, there is no point at which he or she starts from a *tabula rasa*. In adapting to one's immediate environment, the individual takes as fixed certain biological characteristics that structure the body and brain. However, mental models containing beliefs about the world can be considered to be consulted, and strengthened or modified with respect to other relatively fixed frames of perceptive reference. If such an orientation is judged to be misleading, then these themselves may be subject to review and reinterpretation.

The notion of relative levels of rules and rule revision is more familiar in the political case. Particularly in the case of the United States, there is an explicit realization that ordinary politics takes place within the constraints set up by the Constitution. Various innovations may be tried within the constraints of that document with the concurrent realization that these terms are themselves subject to reevaluation and modification. Rules at the constitutional level are not sacrosanct but may be reconsidered along certain procedures. And, these procedures are themselves subject to scrutiny. In this way, political discussion can proceed at several levels at the same time (Buchanan 1989, 39).

### *Hi. Adaptation Within Frameworks*

We have already touched repeatedly on the notion of individuals experimenting with alternate rules within precommitted constraints and that of the reevaluation of such constraints within the framework of still more profound constraints, and so on. This suggests a theory of how knowledge relevant to adaptive success can develop within levels of constraints that lay out the conditions within which subsidiary alternatives at each level may be proposed, evaluated, and selected. As such we distinguish between *unconditional* evolutionary claims, where no substantive conclusions can be drawn as to the desirability of what survives, and *conditional* evolutionary claims which specify the precommitments and constraints that select from alternatives based on conjectures as to what is likely to be adaptively successful (Vanberg 1994a, 185). Again, how success is defined is subject to further claims and conjectures. Constitutional Economics can thus be said to contemplate the nature and construction of rule constraints and how and on what bases these may be evaluated and revised.

### **c. Efficiency**

The notion of Constitutional Efficiency lies at the intersection of the notions of Subjectivism, Normative Individualism, and the Theory of Constitutional Contract. As we have already reviewed the first two concepts, we turn first to gain an understanding of the third. The Theory of Constitutional Contract can best be understood in the context of

earlier attempts to gauge the relative merits of alternative policies. This effort has been the concern of various schools of thought in Welfare Economics. In this light, we take up the Classical, the Paretian and the Wicksellian tradition in Welfare Economics in turn.

In a market, the relevant relationship, whether as acts of joint commitment within an ongoing basis or within a particular transaction, takes place between two bodies, the buyer and seller. By contrast, in politics, there is group action with simultaneous exchange among many parties. The Classical Welfare Economics approach to politics centered on the notion that utility could be aggregated. However, in the early part of this century, it became clear, especially to English economists like Robbins, that utility could not in any sense be measurable within, or aggregated among, persons.

Paretian Welfare economics attempted an alternate way of comparing policies without requiring a measurement of utility. A choice was considered *Pareto* efficient if it reflected a situation in which no change could make an individual "better-off" without some other being made "worse-off." Here, "better-off" and "worse-off," conceived in terms of individual utilities, are reflected through choices made. According to the *Revealed Preference* approach, if a person, observed by an analyst to be in an initial state, moves to a new state given the opportunity, then the new one is revealed as preferred to the old one. If the person chooses not to move, then the initial state is held to be better. The Pareto formulation, while recognizing that values are subjective, is nevertheless not explicit about the context within which evaluations of the same are to be made.

The next step in understanding Constitutional Contract theory requires the introduction of Wicksellian notions of agreement. For Wicksell, the criterion of efficiency for the state or collective use of resources rested in the evaluations of the individuals involved; each person would assess if the benefits to him or her of the mooted proposal would outweigh costs to him or her as perceived. Thus, the *Wicksellian Unanimity Criterion* held that "[i]f any proposed public or government outlay is valued more highly than the alternative market or private product of the resources, there must exist a scheme for tax-share allocation that will be agreed to by all citizens. If there is no tax sharing scheme that will secure unanimous approval, then the proposed outlay fails the test" (Buchanan 1991, 45). Wicksell's key insight leads to the consideration of the structure of decision rules as themselves variable and subject to choice, rather than to weigh the policy options under an implicitly unchanging rule structure.

However, the strict unanimity condition can lead to a *hold-out* problem where each interest is motivated to withhold consent until his or her own best position is reached. Such action can lead to paralysis. Wicksell recognized this potential for strategic behavior and held that some standard falling short of full unanimity may be required for practical operations. In considering the potential for strategic behavior, paralysis, and the practical difficulties encountered in seeking even near unanimity for every public decision, Buchanan shifts the level of argument back and adopts the Madisonian notion where unanimity is adopted at the constitutional level and majority rule is adopted for day-to-day levels of operation. There is considered to be a smaller likelihood of disagreement and a

motivation to be fair at the constitutional rule level due to the *veil of uncertainty* in that rule-makers may expect to be governed by their own rules in the future. If, in the subjective evaluation of the predicted consequences of rules over a sequence of time, each individual on the balance feels that he or she expects to gain a net benefit over the consecution, the vote will turn in approval of the change (*Ibid*, 47). Here, since no project is implemented to which any citizen objects, there can be considered to exist an absence of coercion in the adoption of precommitments. If under these circumstances, individuals do not initiate changes in extant rules and institutions, then that situation may be called *Wicksell efficient* (Wiseman 1990, 109). Wicksell efficiency contrasts with Pareto efficiency in that for the former, values of individuals are given equal weight through unanimity processes of approval whereas in the latter, choice outcomes are 'compared' equally. That is, while the Wicksell notion places stress on the near unanimous adoption of precommitments in the absence of coercion, and while the unanimity condition ensures that equal weight is given to the values of each participant, the Pareto notion rests on an external evaluation at some point in time, of the preferences of individuals without reference of the institutional context within which such preferences are manifested.

We have already noted that the principle of Normative Individualism is concerned with individuals judging the *goodness* of alternate arrangements, and that such evaluations are subjective. To this we have added the notion of Constitutional Contract where the standard of unanimity is applied to value assessments at the level of rules and institutions.

Understanding these can lead to an appreciation of *Constitutional Efficiency* as the responsiveness of social arrangements to value-driven change. As such, it focuses attention on the ways and means by which individuals can more easily express their preferences among social arrangements. We have seen, by contrast, that in the Revealed Preference approach, not only is such consideration of institutional detail implied but its characteristics are also fixed: There is no comparison of institutional alternatives. In other words, whereas Constitutional efficiency is accordant with the notion of developing the rule context within which individuals can express their value preferences among available or imagined alternatives, in the other formulation an external analyst is poised to make conclusions upon observation of manifested behavior at some arbitrary time without necessarily referring to the institutional environment. As Wiseman puts it, "efficiency' is concerned with the responsiveness to the (subjective) value-systems of individual members of a society, which are themselves subject to change. Only the individuals themselves can know whether any set of arrangements are conceived to be improperly coercive: an outsider can at best make inferences from their observed behavior" (*Ibid*, 114).

## II. Order and Change in Individual Constitutions

In introducing the notion of *evolutionary epistemology*, we have remarked on its foundations in Darwinian evolutionary theory as well as on its association with the inductive approach. These in turn have referred to notions of order and processes of change in biological and behavioral or epistemological contexts, respectively.

This section reflects on the issues of order and change in the structure and modification of the configuration of rules among the elements that make up an individual's constitution. The task is broken into four sections: The first three sections contemplate the reconciliation of order and change in the contexts of evolutionary biology, individual behavior, and knowledge structures. The final section uses the insights gained to clarify various economic interpretations of the same topics.

## ***A Order and Change in Evolutionary Biology***

We turn our attention first to understanding change and adaptation within the context of evolutionary biology. Notions of the individual as the basic unit of analysis and of the struggle for existence were imported from economics into biology by Charles Darwin. Subsequent misinterpretations of Darwinian evolution, such as notions of group selection, were ironically later incorporated into economics. Any attempt to refocus the debate must begin with an understanding of current thought in biology, in particular, the appreciation of *population thinking* in its clarification of the Darwinian insight. This then is our present task.

### **1. The Relevance of Darwin's *Origin***

Charles Darwin is regarded by historians of biology as the first to put forth a scientifically plausible hypothesis concerning the mechanism of organic change. They, however, have mixed views as to the indebtedness of the theory of evolution to earlier theoretical developments in economics. Darwin's own notebooks show that he had, in 1838 and 1839, gained familiarity with several of Adam Smith's works, including *The Theory of Moral Sentiments*. As well, in 1838, Darwin had read Malthus's *Essay on the Principle of Population*, the same year he made his theoretical breakthrough and formulated the essentials of his theory of Natural Selection.

According to Schweber (1977), Darwin derived his emphasis on the individual as the unit of explanation from the writings of Smith and other Scottish Common Sense philosophers. The Scottish viewpoint, notes Schweber, held that individual actions lie behind institutional activity and the evolutionary development of society. He considers that Darwin no doubt drew parallels between Adam Smith's individuals with free will and the functioning of society without a designing or directing mind and the stochastic variations among individual organisms and the development of biological phenomena. In analyzing Darwin's writings, Schweber concludes that "[t]here could be no doubt in Darwin's mind that any mechanism that operates in nature must act selectively on individuals. The fact that variations are chance elements made Darwin look at Adam Smith and other Scottish economists and moral philosophers to see how a theory with random elements can account for the stability of the social and economic order"(1977,282).

In his autobiography, Darwin recounts how his observation of plant and animal life in South America and in the Galapagos archipelago impressed him with the possibility of how the fine adaptation of each species to its environment had come about by a series of modifications.

I soon perceived that selection was the keystone of man's success in making useful races of animals and plants. But how selection can be applied to organisms living in a state of nature remained for some time a mystery to me.

In October 1838, I happened to read for amusement Malthus *on Population* and being well prepared to appreciate the struggle for existence which everywhere goes on from long continued observation of the habits of animals and plants, it at once

struck me that under those circumstances favorable variations would tend to be preserved and unfavorable ones to be destroyed. The result would be the formation of new species. Here then, I had at last got a theory by which to work....(1958, 119-120).

It was Malthus's statement that the procreative capacity of humans is such that their numbers grow at a geometrical rate that provided Darwin with the clue he needed to perceive that the force working upon organisms in the natural state is analogous to that which breeders artificially exploit when they undertake to alter the characteristics of domesticated animals and plants. Darwin's insight was that a similar process of selection occurs naturally due to a competition for resources brought about by large scale procreation. Since more young are constantly produced than can be sustained, a large proportion of young must fail to reach adulthood. The ones that do survive must therefore be the ones that are best adapted to environmental conditions as the procreative stock is constantly being culled to weed out the less well adapted. Thus the 'survival of the fittest', to use Spencer's phrase, brought about by the struggle for existence would result in the alteration of varieties and the emergence of new species (Gordon 1991, 506).

While some historians have argued for Darwin's indebtedness to Malthus's population theory and to the views of classical political economists, others have pointed out that these sources served, at best, as a catalyst that brought together the lines of Darwin's thoughts. Mayr (1982), for example, sees Malthus' role as similar to that of a crystal dropped into a saturated liquid (493). Nevertheless, the debate is one centered not on whether but on how much credit is to be shared.

Economics, though to some degree, a mainspring for evolutionary thought in biology, began to veer away by emphasizing the economizing individual within a fixed framework. As Foster (1994) notes, "Biologically driven desires, quantified by Benthamite utility calculus, began to be set on a static framework. Classical political economy, with its historical flavour, began to yield to neoclassical economics with its emphasis on logical reactions"(24). Yet, even as the central paradigm in economics became more involved in optimization, concurrent developments in biology were offering theoretical insights of supreme relevance to economists. Notions, such as that of *population thinking* and others surveyed below, embrace and explain the mechanics of change with respect to a subjectively perceived order.

## **2. Key Notions in Evolutionary Biology**

### **a. Natural Selection**

As we have gleaned from the previous section, the term under consideration was a deliberate metaphor to call attention to the fact that Nature was doing what man familiarly does. Darwin himself noted that it "implies only the preservation of such varieties as occur and are beneficial to the being under its conditions of life"(1959, 164). Endler distinguishes Evolution from Natural Selection by defining the latter as a process that maintains three prerequisites: "the population has (a) variation among individuals in some attribute or trait (phenotypic variation); (b) a consistent relationship between that trait and mating ability, fertilizing ability, fecundity, and/or survivorship (fitness

variation); and (c) a consistent relationship, for that trait, between parents and their offspring, which is at least partially independent of common environment effects (inheritance)"(1992,220). Natural Selection is a non-historical process. It is the natural counterpart to Artificial Selection practiced by breeders. As such, it deals with frequency changes brought about naturally through differences in ecology among heritable phenotypes. This, as Endler has emphasized, may or may not lead to evolution, which is historical and includes random effects.

#### **b. Adaptation**

Burian (1992) separates the term into two meanings: one concerns evolutionary processes and thus considers "transgenerational alteration of features and capacities of organisms in a lineage that enable them to solve problems posed by the environment"(7). These alterations are produced by the differential survival of organisms with small problem solving advantages over conspecific organisms. The other considers a trait or capacity as an adaptation if it is the product of the process of adaptation.

One of Darwin's insights was to distinguish the present adaptive value of an organ or behavior from the notion that it is perfectly adapted. Traits with high adaptive value need not have been selected for. A trait with current adaptive value may be derived either through genetic transmission from previous generations or from a mutation in the present organism. Thus the distinction has to be made between the contribution of the

organ to current adaptiveness and the claim that the organ is an adaptation perfected through an evolutionary process.

**c. Altruism; Group Selection and Kin Selection explanations**

According to supporters of Sociobiology, social science can only achieve scientific status by basing itself on the foundations of biology. E.O. Wilson (1975), its chief protagonist, poses, as the central theoretical problem of sociobiology, how altruism can be possible through Natural Selection given that "other regarding behavior" is endemic in mammalian society and essential in human society.

Darwin, in *The Descent of Man* (1871), suggested that such behavior is possible if the unit of selection is the group, "for those communities which include the greater number of the most sympathetic members, will flourish best and rear the greatest number of offspring" (82). Therefore, altruism is seen to persist, despite its costs to individual fitness, because it enhances group fitness. In this regard, Darwin provides examples of sterile castes of insects, amongst whom there is no genetic competition, where the locus of individuality rests in the hive or colony rather than with the organism. At the level of organisms where "sympathy" for each other can emerge, Darwin hinted at kinship as an explanation of natural selection operating for sympathetic feelings.

Ruse (1993) defines group selection as selection that in some way causes characteristics that help others, including non-relatives, in an individual's group without necessarily any hope of return to the individual. Ruse notes that though Darwin was a

committed individualist, he wavered over his allegiance to individual selection over whether biological evolutionary theory extends to the moral practices of human groups. In particular, Darwin could not see how altruism would simultaneously help one's own reproduction:

It is extremely doubtful whether the offspring of the more sympathetic and benevolent parents, or those which were the most faithful to their comrades, would be reared in greater number than the children of selfish and treacherous parents of the same tribe. He who was ready to sacrifice his life, as many a savage has been, rather than betray his comrades, would often leave no offspring to inherit his noble nature. The bravest men, who were always willing to come to the front in war, and who freely risked their lives for others, would on average perish in larger number than other men. (Darwin, 1871,163)

Natural selection, working at the level of individuals would not seem to preserve or bring about a heritable moral sense. At this final point of evolution, Darwin could not conceive how altruism would persist without the operation of group selection effects(Ruse, 1993,50).

With the rediscovery of Gregor Mendel's work on inherited variations among plants at the turn of this century, group-selectionist accounts of altruism and other fitness-reducing traits fell out of favor among biological theorists. They noted that the possibility of group selection for traits that are individually maladaptive but socially beneficial are unlikely, given an understanding of population genetics. Still, the group selection notion continued to be accepted outside the circle of such theorists. V.C. Wynne-Edwards (1962), in particular, is noted for having attempted to reconcile group

selection within the Darwinian explanation. His explication involved the concept of altruistic self-restraint on the part of individual organisms who reproduce at rates below that optimal for personal fitness but optimal for group survival in cutting down on their consumption of resources. Population numbers were considered to be regulated so as to maximize the likelihood of group survival.

The notion of group selection was thereafter again challenged. G.C. Williams (1966) held that adaptive significance should not be accorded to a trait at any level above that necessary to explain the persistence of the trait in question. He argued that the locus of selection is always the gene so that altruism had to be shown as adaptive for the individual allele. Also, J. Maynard Smith (1964) demonstrated that selfish genes could subvert altruistic groups as altruism is an invadeable strategy. The most pronounced case against group selection, as put forward by Dawkins (1976), was that in the absence of any mechanism to compensate free-ridership, that is the tendency of some members to capitalize on the activities of other members who perform socially useful but self-sacrificial tasks, any free riders in the group are likely to expand in numbers and alter the makeup of the group (8). Thus, there is no explanation of how the advantageous behavior is rewarded or replicated.

As group selection was being attacked, kin selection was seen as an alternate explanation for altruism. W.D. Hamilton (1964) argued that Nature will select for the strategy that leaves the largest number of copies of the gene that codes for it. The individual who performs an act of self-sacrifice may eliminate his own chromosomes

from the gene pool but if this act preserves the lives of others who have the same genes in their chromosomes, there may be a net increase in gene survival. Nature will select for inclusive fitness, which combines the organism's fitness with the fitness contribution of each of its kin - the other organisms with which it shares copies of the same genes. Thus, altruism was seen as emerging as an adaptive strategy for an individual that is a part of a kin group if Nature, by selecting for inclusive fitness, engages in kin selection. While Hamilton's work dealt with ant and bee colonies, E.O. Wilson considered possible that human sociality could be driven by the selectionist viability of genes that program individuals to perform selfless acts for group benefit (Gordon 1991, 543).

Rosenberg (1992) points out two problems with this approach: First, he asks how individual kin-altruists identify other animals as close enough kin, and second, he ponders why altruists provide resources at their own expense to unrelated organisms, especially in human societies which are marked by less kinship and more cooperation(23). Moreover, the analysis of Prisoner's Dilemma models have shown that the costs and benefits make free-riding an adaptive strategy for individuals and altruism a maladaptive one. To the extent that Nature selects to maximize fitness, altruism will be discouraged and free-riding encouraged when the pay-off structure resembles that of a Prisoner's Dilemma problem.

Using computer simulations, Axelrod (1984) has shown that, under certain circumstances, the ultimate tactic, for an individual engaged in a tit-for-tat strategy in an iterated Prisoner's Dilemma setting, points to cooperation. This leads to the appreciation

that, at least with respect to human society, such cooperation, though fostered by core human emotions such as anger or remorse, is in essence a learned behavioral response, risen to overcome the relevant free-ridership problem, rather than one that is transmitted genetically.

#### **d. Population thinking**

Ernst Mayr, a leading authority on evolutionary theory and the history of biology points to five central implications of Darwin's theories: The replacement of static world with one that has evolved over history, the demonstration of the implausibility of creationism, the refutation of cosmic teleology, the abolition of justifications for anthropocentrism by applying the principle that present population species have descended from common ancestors, the supplantation of explanation by "design" in the world by the mechanism of natural selection, and the replacement of essentialist thinking with the notion of *population thinking* (1982, 501).

Indeed, Mayr holds that Darwin could not have arrived at his understanding of natural selection without having adopted *population thinking*. According to Mayr, population thinkers stress the uniqueness of everything over the type. In particular, "they emphasize that every individual in a sexually reproducing species is uniquely different from all others....There is no "typical" individual, and mean values are only abstractions" (*Ibid.*, 46). In turn this implies that groups of biological entities must be dealt with in ways markedly different than that affected in handling groups of identical inorganic

substances. To return to Mayr's words, "[t]he difference between biological individuals are real, while the mean values which we may calculate in the comparison of groups of individuals (species for example) are man made inferences" (*Ibid.*, 47). Thus, concludes Mayr, it was this *population thinking* perspective that enabled Darwin to realize that the struggle for existence described by Malthus was a phenomenon occurring at the individual level rather than at the level of species, producing the most fundamental revolution in biological thought (*Ibid.* 487).

But what is an individual as opposed to a species or group? Hull (1992) identifies two senses of the term "individual." The first, common sense meaning refers to a spatiotemporally located material body that remains unchanged or undergoes relatively continuous change through time. In evolutionary biology, so called "natural" individuals are defined as those entities to which the laws of nature apply. Ontological status is thus theory dependent. To discern natural individuals, one has to grasp the processes under which they function. Biological individuality is thus inherent to the selection process; if selection can be split into replication and interaction, individual adaptation can be considered to be engaged with both properties (180-184).

The common sense conception of a species consists of a morphology, a list of features which is sufficient for species membership, but of which no one is necessary (Ruse, 1993, 98). Mayr's definition is more satisfying. He notes that a species can develop "if a population which has become isolated from its parental species acquires, during its period of isolation, characters which promote or guarantee reproductive

isolation when the barriers break down" (1942, 155). Speciation then occurs when effective devices develop to prevent the inflow of alien genes into gene pools.

### **3. Lessons from the Biological Account of Change**

The experience in biological thought suggests that economists look away from notions of group selection or kin selection in seeking explanations of human cooperation. Moreover, *the population thinking* approach points to a focus on the individual, whether conceptualized as a gene, a person, or as a group, *et cetera*, as the basic unit of explanation. What constitutes such individuals should be defined by the process of selection which, as we have learned, is, as a non-historical process, to be distinguished from evolution which incorporates the carrying forth of selected characters through time. In addition, we must bear in mind that what has been carried through may not necessarily prove adaptive in current use. We have also noted that biological species are constituted by the ability of characteristic individuals to interbreed successfully. Consistent with this approach, those groupings may survive which allow for the generation of novelty by individuals in their productive and social relations which in turn enables heightened opportunities to survive in changing environments. Such selected characteristics may be propagated though only if species compatibility is maintained. We, as economists, may therefore draw that current adaptive success for a group rests on the ability and opportunity of its constituent individuals to generate novelty while preserving such

characteristics of coordinative and cooperative order so as not to invite disintegration and, furthermore, that these are not incompatible processes.

Such an interpretation, based on an enlightened understanding of biological evolution, would return economics to its roots in Scottish Moral Philosophy. Darwin's theory of Natural Selection was, after all, inspired by the Scottish philosophers who held the view that civilization was *driven from behind* into an open future by the efforts of individual agents to improve their adaptation to their changing surroundings. This driving force was viewed as being powered by the continual experimentation, whether deliberate or unintentional, of individuals who, in pursuit of their own objectives, as they see them, and in reaction to new circumstances, attempt modifications of their less successful approaches. Individuals viewed as *persuasively* adapting to their circumstances would attract emulators thereby propagating successful innovations. Such an understanding, as should properly be shared in the camps of biologists, psychologists, and economists, demonstrates how functionality and adaptiveness can emerge without the requirement of foresight.

Finally, the notion of *population thinking* prompts the consideration of *order* as based on "man made inferences," and that change is a pervasive phenomenon driven at the individual level rather than at the level of such abstractions. In turn, the insight that there is no objective order but rather subjective interpretations of the same can lead to the appreciation that such inferences if shared can serve as the basis for social cooperation.

## *B. Order and Change in Individual Behavior*

### **1. Rule Following and Personal Constitutions**

The central problem in Social Science rests on how best to capture human behavior in a model. The traditional economics approach models man as a rational chooser: Choice is based on gathered information which, colored by subjective biases, translates into personal knowledge of the issue as well as interpretation of the possible outcomes of alternate decisions. Implicit in this notion is that choice improves as more information and less subjective coloring are introduced. This system stresses the ability to gather, store, and 'rationally' manipulate such information.

Sociology looks at the level of cohesiveness and organization in society and concludes that there is a social intelligence that drives the system. According to Durkheim's methodological postulate, a social scientist must "consider social facts as things" that exist outside and prior to the scope of an individual's meaningful action (1958, 14). Although the sociologist's criticism of the Rational Choice model - that it fails to account for norms and social cohesiveness - is valid, it mistakenly pursues a collectivist rather than an individualistic methodology. Consequently, Sociology fails to adequately justify its claims because it fails to provide a rationale for the conduct it seeks to explain other than that it is beneficial to the social order. This *functionalist fallacy* is most evident in the inability of the sociological model to describe convincingly how the social system came to be; the theory assumes a pre-given, shared value orientation and in

doing so, postulates coherence antecedent to economic exchange or social intercourse (Vanberg 1983, Shivakumar 1989).

The Rule-following approach, alternatively, successfully blends the methodological individualism of Economics with the issues of habits, routines, and social and moral order that have been considered the province of Sociology. By explaining the generation and maintenance of each individual's actions within the bounds of certain dispositions, the Rules approach provides a cogent structural understanding of both individual and social behavior. More, it demonstrates how individual self-interested behavior can be developed so as to be consistent with a social order. Reflecting on the limitations of human cognitive ability, the rule-following approach shows that appropriate categorization of problem situations can not only lower the information threshold but also raise the predictability of actions. This in turn makes it possible for each individual to base his or her decisions on the anticipated actions of others (Vanberg 1993a).

Just as growth along the branches of a tree occurs through the selected development of new shoots off established branches, the process of adopting relevant rules is formed through trial and error where innovations to the existing body of rules are tested as to whether they are adaptively useful. *Adaptive rationality* refers to the process by which individuals adapt repertoires and behavioral patterns that are increasingly suited to the environment. Rule-following can hence be thought of as developing in a process

that classifies various types of recurring situations according to the best solution routine that has so far been developed within a particular niche (Vanberg 1993,179).

Such rule observance, strengthened by psychological conditioning, lends understanding as to how a moral order can emerge among groups of individuals. In sum, the rule-following approach places its primary emphasis on the formulation and maintenance within each individual of a disposition to act within the confines of an overall framework. These interests, as reflected in the *personal constitution* of the individual, may bring about a rearrangement of inclinations so that actions that are taken in self-interest are brought into correspondence with those that complement the moral order. "The question [then is one] of how people devise effective rules to govern their future behavior, whether the behavior is continuous, regular, or periodic, or single-shot; whether the behavior is alone or as the member of a team with common interests; whether it is solitary or with someone's help" (Schelling 1985, 358). Schelling coins the term *egonomics* as the strategic economics of consciously coping with one's own behavior (1984,63).

Changing one's preference structure so as to diminish the attractiveness of the pay-off now in favor of one later can be accomplished by various techniques of pre-commitment. Managing available and future options, can be accomplished through manipulation of character, of information, and of inner space (Elster 1979, 103). Such manipulation can be accomplished by setting up a reward-punishment schedule, by acting to restrict by physical or legal means options or information about options, by

conditioning habits and routines that automatically lead one to follow certain procedures, and by acting to insulate oneself from certain stimuli or temptation (Schelling 1985, 361).

For example, we may encourage certain behavior by praise and discourage others by censure. Through such conditioning, certain conduct become stamped-in. Clear limits on activity can also be set so that stepping outside these pre-prescribed bounds affects us negatively. Setting up side bets to rearrange the reward system so that any failure to follow up on one's commitments affects other factors in one's utility function can also be set-up. Finally, we may consider the case where external mechanisms may be preset to force a certain option at a future date; an alarm clock serves as an exemplum. The incorporation of such strategies to bolster one's dispositional inclinations can aid individuals to realize the benefits of rule-following. Understanding the same can serve as the basis for an individualistic theory of social phenomena.

The notion of a *personal constitution* involves both the idea of conditioning behavioral predispositions, as well as the notion of operating within a framework of rules that is constantly revised on the basis of the perceived successes and failures of the past. As such, it draws from the two dominant traditions in twentieth century psychology: Behaviorism and Cognitivism. The remainder of this section takes up these behavioral theories in turn and then argues for a duality in outlook that bridges both positions. This bridge rests on the notion, distinctive to Constitutional Economics, of frameworks nested within frameworks with each framework providing the parameters within which innovation can be introduced, competition can be fostered, and adaptation can be

impressed. Such an approach, it is suggested, will serve as a behavioral cornerstone for Social Science.

## **2. Psychological Models of Behavior**

Having earlier grasped some understanding of change and adaptation at the biological level, we turn now to see how the process continues at the behavioral level. While an explanation of the process of experimentation and selection of acts that set up a repertoire of behavior has been advanced by the Behaviorist school, the Cognitivist school has insisted that human behavior is guided by mental paradigms. We suggest that a resolution may be found in that mental paradigms, operating at various levels, may extend hypotheses that provide the basis for actions that may be selected or rejected. In the process, the paradigm that guides behavior is successively refined to adapt to prevailing circumstances.

### **a. Behavioral Theories of Learning:**

In capturing the processes by which organisms learn, behavior theorists have argued that an organism's pre-wired repertoire of actions is supplemented by those derived from its experiences. While some wirings reflect new connections made between stimuli, others involve links made between acts and their consequences. Behavior theorists see their task as that of discovering how these rewirings occur. Given the view that even complex behavioral patterns are made up of simpler ones, the behavioral

theorist concentrates on understanding simple situations in relatively simple creatures such as dogs and pigeons.

Behaviorism reigned as psychology's meta-theory from 1913 to 1960. It held that psychology was the science of observable behavior. As such it was anti-theoretical but rigorously experimentalist in orientation. Its physicalist view denied the existence of subjective entities or the notion that organisms have goals (Baars, 1986, 7). Radical behaviorists such as J.B. Watson and B.F. Skinner defined the goal of psychology as that of prediction and control of behavior; merely understanding human psychology meant little (*Ibid.*, 45).

In reviewing Classical Conditioning and Operant Conditioning as forms of learning, we attempt to examine how behavior theorists tried to reconcile the phenomena of learning with those of innate reflexes.

#### *i. Classical Conditioning*

This theory, popularly associated with the name of Ivan P. Pavlov, holds reflex as the genetically driven systematic connection between stimulus and response. Behaviorists proposed that associations connect physical stimuli with physical responses. In Pavlov's famous experiment, when food was made conditional upon the sound of the bell, the dog would learn to anticipate the food and begin to salivate before it was actually presented. In general, reflexes could be made conditional on any reliable signaling stimulus. By showing how new events in the environment could come to evoke standard reflexes, theories of classical conditioning sought to explain, if at least in principle, how

everyday actions complex, voluntary, and apparently purposeful could be reduced to simple causality (Baars, 1986,26).

Yet, Pavlov's experiments only showed how old responses could be connected to new stimuli. As such this theory could not account for the generation of new behavior. This gap was filled by the development of Operant theory.

### *ii. Operant Conditioning*

Skinner's Theory of Operant Conditioning extended the reaction of organisms to endogenously activated stimuli. While actions generated from within cannot be predicted, the organism learns that certain types of behavior are rewarding while others are unpleasant. This sets up a repertoire, or set of behavioral propensities, to be repeated in circumstances similar to the ones where the given action was perceived to be successful.

Experimentally, operant conditioning is affected by confining an animal and depriving it of some reinforcer such as food. Then whenever the creature moves in some particular way, it is given some food. When the animal replicates the selected action more frequently in response to the instigated circumstances, that action can then be considered to have been conditioned by reinforcement. Behaviorists hold that reinforcing stimuli are discriminators of circumstance and thus are related to neither purpose nor reward. A reinforcing stimulus is defined, somewhat circularly, as something that will increase the likelihood of a response that precedes it.

In sum, operant conditioning theory makes three claims: First, that a stimulus is defined by the way an organism responds to it and a response is defined by how effective it is in gaining from the environment a reinforcing stimulus; second, that operant conditioning can explain any new activity that people or animals can perform; and third, that a psychological theory of the internal mechanisms of the mind is unnecessary in that an understanding of the stimulus-response relationship will lead to the prediction and control of behavior (*Ibid.*, 63).

Having gained an appreciation of behavioral theories of learning, let us pursue this lead, in the next section, to understand how learned repertoires and behavioral propensities complement biologically driven behavior and how, within this view, learning routines can be changed and fine tuned.

#### **b. B.F. Skinner's Behaviorism**

Skinner's name is particularly identified with Operant or Radical Behaviorism. This school of thought considers behavior as the fundamental subject of study. In other words, behavior is not a means to understand cognition, the mind, or the brain. The task of the psychologist is then to use experimental analysis to identify classes of behavior on the basis of their origins. Skinner's investigations were conducted in an experimental chamber (Skinner Box) in which simple stimuli, such as lights and sounds, simple responses, such as lever presses and key pecks, and simple reinforcers, such as food and water were arranged to study the behavior of rats and pigeons.

We now briefly encounter some of the vocabulary that these experiments generated: *Respondents*, a class of responses, originate with the stimuli that elicit them (like the bell associated with food that caused Pavlov's dog to salivate) while *Operants* are engendered by their effect on the environment. In other words, they do not require eliciting stimuli and are *emitted* (like a pigeon that finds that pecking a sequence of keys releases food). The consequences of a response may either through *reinforcement* or *punishment* affect future propensities of behavior. These *contingencies of reinforcement* or punishment are the particular relations that can be established between responses and their consequences (Catania 1988, 5).

Of Skinner's wide output, we focus on his accounts of how operant theory is related to biology, how evolutionary variables, combined with those operating within an organism's lifetime combine to determine its behavior, and how one may distinguish between rule governed and contingency shaped behavior. In "The Phylogeny and Ontogeny of Behavior," Skinner draws an analogy between operant conditioning and natural selection in the provenance of behavior. He notes that a certain response is more likely to recur if it is associated with ontogenic contingencies that are reinforcing, just as a different response may be likely to recur if it is associated with phylogenic contingencies that favor it through natural selection.

In "Selection by Consequences," (1981) Skinner notes that human behavior is jointly determined first, by contingencies of survival through natural selection, second, by contingencies of reinforcement, and, finally, by contingencies maintained in the social

environment. These correspond to biological evolution, behavioral psychology, and anthropology. Learned behavior is considered to complement inherited behavior: "Since a species which quickly acquires behavior appropriate to a given environment has less need for an innate repertoire, operant conditioning could not only supplement natural selection of behavior, it could replace it"(12). Various forms of behavior arise endogenously, are reinforced or weakened, and we are left with some subsequent distribution of behavior. This would appear to match with Mayr's view that a species consists of a distribution of organisms rather than a fixed type.

At the third level, Skinner holds that the evolution of the social environment begins at the level of the individual. Better ways of tool use, food production, or social interactions are reinforced by their consequences. Cultural practices originating in this way contribute to the success of the practicing group in solving its problems(14). Skinner points out that this formulation does not imply competition between cultural groups. As he notes, "practices are transmitted from generation to generation when those who acquire them under the contingencies arranged by one generation become the transmitters to the next"(1988,36).<sup>4</sup>

Finally, in "An Operant Analysis of Problem Solving" (1966b), Skinner points out that in order to solve a problem, we must change the situation until we get a response. These changes may arise out of making a calculation, consulting a reference, and so forth.

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We revisit the issue of the evolution of cultural practices, with particular reference to the merits of arguments regarding competition among cultural groups in section III-B

When an elicited response is reinforced, the likelihood that it will be repeated in similar situations is heightened. This is done by identifying distinctive markers that characterize the given response (218). For example, in the statement "red apples are sweet," *red* is the property of the discriminative stimulus while *sweet* is the correlated reinforcer.

Using external discriminators enables attempts at cooperative problem solving. These, extending to informal laws, such as grammar, as well as formal laws, such as those pertaining to religion or government, also specify contingencies of reinforcement and consequences. As Skinner puts it, "[t]he culture solves problems for its members by transmitting discriminative stimuli already constructed to evoke solutions" (223). Thus, culture, reflecting produced grammar, laws, et cetera, can lead its members to behave more effectively without direct or prolonged contact with contingencies. However, rules may become troublesome if they do not respond to changes in contingencies.

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According to Skinner, *induction* is the construction of a rule which generates behavior appropriate to a set of contingencies while *deduction* is the generation of second order rules for manipulating first order rules. For example, the rule, "red apples are sweet" is based on observations of various types of apples with respect to their flavor. Such a rule sets up the contingency to expect when one comes across a red apple. In general, rules are derived from empirical discoveries of the success of certain practices, or from an examination of the contingency maintaining systems which the first-order rules

describe. Skinner is resolute in pointing out that we must not mistake the discriminating stimuli as the controlling agent of behavior. Behavior is considered to be motivated by the contingency that they specify - one does not eat an apple because it is red but rather because it is sweet. Similarly, discriminative stimuli in the shape of rules should not be mistaken as the agency of action (227). Contingencies pre-exist rules. Science analyzes contingencies of reinforcement found in Nature to formulate rules and laws which make it possible to behave appropriately without having to learn them first-hand. We may thus, for example, follow the rule not to extend our hand over a flame without first having to get burned in order to learn not to.

### **c. Cognitivism**

While Behaviorists base their methodology on the study and control of the physical movements of an organism, Cognitivists interpret psychology as the study of internal processes, conscious or not, which may be inferred by an outside observer on the basis of an organism's behavior. Cognitive psychologists observe behavior in order to make inferences about the underlying factors that can explain behavior. They talk of representations that organisms have of themselves and of the world, and of the transformations that these representations undergo.

#### *i. Evidence for the Cognitive Shift*

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As we point out in later pages, the concept of Induction, as expressed by Holland and others can be understood in terms of an appropriate synthesis between Behaviorist and Cognitivist approaches in psychology.

The paradigm shift in meta-theories, from Behaviorism to Cognitivism took place as computers were coming of age in the 1950s and '60s. Cognitive meta-theory also was supported by research at that time into memory and into linguistics. We take up these threads in turn.

(a). *Machine Metaphor*

As computers began to come of age, spurred by wartime interest in their development, they provided the "machine metaphor" basis of the cognitive shift. Computational theory, underlying the development of the computer, specifies mathematical principles that can be applied to symbolic devices. Researchers pondered that if the nervous system was adapted to represent and symbolically transform the world of the organism, then the principles of symbolic language manipulation could be applied to unlock it as well. The mathematical definition of information states that "information exists when a signal reaches a receiver, enabling the receiver to make a *choice* within a set of alternatives"(Baars, 1986,150). The smallest unit of information that enables the receiver to discriminate between two alternatives is defined as a *bit*. Using binary coding, any mathematical symbol can be represented in terms of bits. Thus a computer can "act out" arithmetic operations, logical deductions, and so forth. This implied that information could be defined independent of any particular physical medium of representation (*Ibid.*, 151).

Researchers noted that humans displayed a similar disregard for the medium of information but rather showed a preference for the information itself. For example, when we hear a sentence spoken, we seldom are able to recall the exact words used, but, on the other hand, are usually able to provide a paraphrase of the forgotten sentence. The nervous system was seen to respond to the information and not particularly to the physical impulse that relayed it.

Yet, computational ideas spread only gradually, and formal connections between computational and psychological theory was not made until the founding of "cognitive science" in the late 1970s. Although the computer showed that representations and information processing were possible, psychologists were slow to be convinced that humans did have mental representations and goals and that they do something akin to processing of information (*Ibid.*, 157).

(b). *Mental representations*

Computers store information through buffer memories, small local memories that are used whenever two events that arrive at different times must be related to each other. In other words, a buffer is a temporary holding bin of memory. The cognitive revolution was spurred as evidence began to accumulate for the existence of such temporary holding memories in human nervous systems. Explanation of evidence that humans could only hold about seven unrelated numbers or words in immediate memory was put forth by the psychologist George Miller as "chunking." It was thereafter discovered that all items held in short-term memory tended to move into long-term memory when the new items were integrated into existing knowledge. Long-term memory was found to be highly organized. Indeed, that memories should be classified in some organized scheme profoundly revolutionized thinking in psychology.

But how is long-term memory organized? We turn back to developments in Artificial Intelligence where researchers, attempting to set up computer systems soon recognized that any sentence requires abstract, prior knowledge in order to be understood.

Comprehension of the phrase "time flies like an arrow" requires prior knowledge of metaphors so as not to be interpreted in the same way as "fruit flies like a banana." Similarly, information available to the senses were seen to require prior knowledge to be decoded. When chunks of memory are separated from the context that normally give them meaning, the relationship between the items is lost. Over the decades, clear empirical results pointed to the necessity of speaking in terms of abstract semantic representations that encode not just the meaning of individual words, but an inferential, deeply interpreted representation of the world; or, to return to that pesky word, a paradigm . Rather than thinking in terms of chains of stimulus and responses, it came to be accepted that humans represented their world, though implicitly, much as scientists do in abstract theoretical terms (*Ibid.*, 162-170).

(c) *Linguistic evidence*

In a review of Skinner's book, *Verbal Behavior* (1957), Noam Chomsky (1959) challenged the view that language is essentially a chain of responses emitted when called for by the environment and that language is learned by a process of trial and error conditioning. Chomsky argued that language was not another instance of behavior that could be manipulated in animal experiments but rather demonstrably rule-governed and generative. Moreover, in order to understand language, one had to postulate the existence of a powerful theoretical construct, a *Transformational Grammar*, underlying its surface characteristics. Behavioral theory was averse to postulating the existence of underlying rules generating responses as responses were thought to be paired with stimuli through

conditioning. As this deep rule structure was not directly observable, it was thought to be unscientific. Chomsky and Miller (1958) showed that it was impossible for people to acquire, by conditioning, all the sentences they could speak and understand. They concluded that individuals must possess a relatively small set of rules that enable them to put together and comprehend a variety of syntax structures.

*ii. Herbert A. Simon, polymath*

Any discussion in an economics paper of cognitive psychology cannot neglect to recognize the pioneering contributions of Herbert Simon in the fields of Artificial Intelligence and Psychology. His life's efforts have earned him, in addition to the Nobel Prize in economics, the Turing Prize in computer science, and the Distinguished Scientific Contribution Award from the American Psychological Association. Even so, it may come as a surprise to many economists that Simon considers himself primarily as a behavioral scientist (Simon, 1986, 362). He is recognized in professional psychological circles as a radical cognitive psychologist.

Simon notes that any exploration of a problem space is highly selective as the human decision-making apparatus views only an infinitesimal fraction of the whole. Given its serial, one-at-a-time approach of groping through long-term memory and the sensory world, the mind can only access a minute amount of information in any reasonable amount of time. To cope with this limitation, we rely on experience: The limits of short-term memory are measured in chunks. As one gains experience, collections of chunks become arrayed within single chunks. This is seen to explain why

"a person who is experienced in a particular field can, by noticing some features of a situation, immediately access a lot of information about what is relevant to that situation" (*Ibid.*, 363).

### *iii. Concepts and Categories*

Whereas Behaviorism understands the notion of categories as stimuli that evoke similar responses, most Cognitivist approaches hold that concepts exist *a priori* waiting for our minds to discover them. *Concepts* are held to be the building blocks of knowledge representation, that "notion of the world by which an intelligence is able to understand some aspect of the world"(Hampton and Dubois, 1993). The word *category* then refers to a class of entities that are grouped together, or generalized, on the basis of some rule. Generalization is thus a cognitive act, not just a failure of sensory discrimination as is implied in the Behaviorist understanding (Shepard, 1987,1319). For example, the concept of the color green is a psychological state by which an agent is able to appreciate that a given wavelength is a shade of green, whereas the category of green refers to the band of wavelengths in the spectrum that might be so labeled. Most categorizations are seen to rest on some such descriptive information.

As our mental abilities would be overwhelmed if we crafted an unique response to each encountered event, we possess the capacity to categorize by rendering discriminably different things as equivalent. While there exist an infinite number of ways of grouping

events and objects, the categories we invent are only a relative few. Appropriate categorization reduces the complexity of the environment, helps us identify objects and provides cues for appropriate action or avoidance thereof, reduces the need to constantly revise frameworks of thought, and permits the cross-indexation and observance of relationships between classes of events. Problem solving in this context consists of regrouping elements in our environment in a continual and never-ceasing process of adaptation (Bruner, Goodnow, and Austin, 1990 [1956]).

However, in a social setting, there may occur a failure to agree on the meaning of terms when individuals, each of whom may have a personalized way of construing his or her environment, have fundamentally different concepts for understanding a domain and hence possess differing categorizations for carving it. While cultures can be identified on the basis of societies of individuals with a unified world-view in this respect, the question is then one of how coherence in recognizing categories can be maintained in the face of novel circumstances. Michalski (1993) proposes that conceptual knowledge should be divided into two components: At the first tier is the Base Concept Representation (BCR) which represents strongly idealized and clear examples of standard usage of a concept in the understanding of familiar cases. At the second tier are Interpretation Rules (IR) which provide constraints on how the base representations can be altered in light of contextual information. IR thus provide the meta-knowledge that guides the adaptation

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This point can be considered to be in accord with that raised by Hayek in *The Sensory Order*, See Section III-C-2

process for new situations. Though Michalski refers to the psychological adaptation of the individual, it is but a step to acknowledge that such IR can also be expressed in a more explicit form that attempts to preserve coherence among the evolving perceptions of diverse members of a community.

### **3. Psychological Adaptation Within Constraints;**

#### **Competition Within and Among Alternative Frameworks**

Despite the strong evidence that cognitive theorists possess of understanding and action based on mental representations of the world, Behaviorist theory continues to offer several attractive features. First, it extends biological evolution to the level of behavior by posing that adaptation to stimuli takes place through reinforcement and conditioning. This stresses that there is no inherent end-state or purpose in behavioral adaptation just as it is not found in biological adaptation. Second, it rejects group selection. Social evolution is considered to be propelled at an individual level; that is, individual innovation reinforced by contingencies generated in the social sphere, are held to be the driving force behind the cumulative process of civilization. Finally, it draws the distinction between the discriminating stimuli in the form of rules and the contingencies that form the controlling force of behavior.

It would seem therefore that a happy synthesis of the two approaches would consider extensions to mental paradigms as subject to various contingencies of

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It is such social contingencies that are of particular concern to Constitutional economists.

reinforcement. That is to say, contingencies of reinforcement might be considered to play on the level of mental blueprints (either as portions or derivatives of) rather than on the level of particular acts. One attempt at such a reconciliation may be read in the recent efforts of Holland *et al* According to this conception, the

cognitive system represents the world with which it interacts using mental models, constructed from rules and organized into default hierarchies. In assembling a model of the current situation, (often in fact, a range of models which are allowed to compete for the right to represent the environment), the system combines existing rules which are themselves composed of categories and the relations that weld the categories into a structure providing associations and predictions. The assembly of a model, then, is just the simultaneous activation of a relevant set of rules. The categories are specified by the condition parts of the rules; the (synchronic) associations and predictive (diachronic) relations are specified by the action parts of the rules (1989, 29).

The authors go on to note that model construction is based on categories of expectations. This process is seen to be propelled by failures in the current model, triggering the formulation of more specialized rules. Such additions of further refinements, they note, must be balanced against the increasing complexity so engendered. More, since such refinements take place in the context of an individual's experience, beliefs about laws underlying physical and social events are necessarily subjective (34-38). Additional limitations in the ability of individuals to successfully identify and reward a particular successful strategy stems from the fact that more than one mental model may be acting at a given time. Thus, as the authors conclude, "reinforcement does not automatically "stamp-in" behaviors, as traditional behaviorist

theories of learning would have it; it provides feedback about the relevance of the various predictions to goal attainment"(70).

Such an examination of how knowledge is modified through the process of problem-solving is basic to the study of *induction*. In understanding how individuals learn to cope with their environment, induction poses that individuals pick out patterns that are considered relevant in some sense and base deductions or predictions on hypotheses so formed. Given that a "range" of such hypotheses "compete for the right to represent the environment," the central problem of induction is one of specifying the constraints within which inferences can be drawn that are pertinent to the faced problem situation. Such constraints can be thought to be housed in higher-level inferential rules; understanding everyday events are influenced by more abstract sets of pre-existing rules, note Holland and company (3).

Viewing induction as being closely tied to problem-solving also "implies that inferences normally will be made only about the representations that are currently active" (9) - that is, they characterize relevant data from the prevailing environment. When this representation or "world-view" is no longer valid, a permanent change in at least some facet of associated mental models is likely. The trial and error process inherent in evolutionary learning weeds out those representations that no longer provide valid interpretations while generating new ones and strengthening those that lead to better prediction. Holland and others conclude that the inductive mechanism must possess three characteristics: it must evaluate the fitness of existing rules, generate new and possibly

useful rules and, finally, develop (induce) second order associations or "welds" between existing representative models (68).

### C. Order and Change in Knowledge Structures

We have attempted to lay the groundwork for a theory of social institutions that is part of a broader framework which includes a particular theory of human knowledge and behavior within a thoroughgoing evolutionary perspective. In this regard, we have explored the issues of order and change in evolutionary biology and in individual behavior. In turning next to understanding order and change in the structures which orient human knowledge, we reveal that the components for such a broad evolutionary outlook can be found in the writings of Friedrich Hayek.

#### 1. Epistemology and Psychology

Given an universe of things, we must somehow make sense of it in order to better adapt to our surroundings. How we go about making sense of our environment has been the source of long-standing debate in philosophical circles. On one hand, it has been held that objects take on meaning only within the context of conceptual schemes, while on the other hand, it is maintained that such conceptual schemes are themselves the product of our association of events. Empiricists such as Locke, Berkeley, and Hume held that all our ideas come from experiences; that no proposition about any matter of fact can be known to be true independently of experience. The mind therefore is considered to be a *tabula rasa* until experience writes upon it<sup>8</sup>. Hume held that we may talk of one thing

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<sup>8</sup>See: John Locke, *An Essay Concerning Human Understanding*, Book II, Chapter VIII, Locke distinguishes between primary qualities, which are intrinsic and can exist independent of sentient minds,

causing another but all we mean is that events of the first kind are mentally conjoined with events of the second kind; the so-called necessity that the second follow the first is thus simply a reflection of our habitual expectation<sup>9</sup>

In contrast, the Rationalists argued that many aspects of our knowledge are based on innately given characteristics of the human mind - that is, many aspects of perceptual experience are a part of our natural endowment and do not depend on learning. Alternatively stated, there are innate ideas, *a priori* predispositions, that orient the organism in advance or in the absence of empirical verification. We are considered to be born with inherited dispositions, to have thoughts of a certain form and structure. According to Kant, what experience does is to provide the sensory input that is then ordered according to innately given categories (Copleston, 1960, 57).

As we have just seen, this debate has been carried into the present by psychologists of the behaviorist and cognitivist camps. Behaviorist psychology continues a tradition, articulated by Hume, that metaphysical theory should be "committed to flames" unless it could be tested empirically (1962 [1748], 163). While Behaviorists base their methodology on the study and control of the physical movements of an organism, Cognitivists, as we have noted, interpret psychology as a study of the internal processes

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and secondary qualities, which are mind dependent. Berkeley, in *Three Dialogues between Hylas and Philonous* argues for the mental status of primary qualities as well. We are then left in a world with perceiving minds and their ideas. The universe is through and through mental - a theory of reality referred to as *subjective realism*

<sup>9</sup>David Hume, *An Inquiry Concerning Human Understanding*, Section IV, First published in 1748

of the mind; they talk of a model based representation that organisms have of themselves and of the world, and of the transformations that this model undergoes.

In reconciliation, an alternative, evolutionary epistemology, was proffered that drew an appropriate synthesis of these two historically distinct approaches in considering competition among mental models within the framework of higher and relatively more permanent levels of mental models. Further, these models were considered as themselves conditioned by successively more fundamental competitive orders of rules, transferring from ontogenetically to phylogenetically evolved constraints. In short, there is considered to exist relative levels *of a priori* predispositions which condition the path of knowledge acquisition. At the same time, it was recognized that these predispositions are themselves subject to evaluation by the failure or success of the individual's ability to adapt using the knowledge generated within such frameworks. The section to follow lays out Hayek's own interpretation of such a scheme.

## **2. Hayek's Psychology: Evolutionary Epistemology within Institutional Constraints**

Hayek's investigations in theoretical psychology contained in *The Sensory Order*, begun in 1922 though published only in 1952, offer remarkably prescient insights into the architecture of the institutions of thought. They anticipate the development of contributions in Cognitive psychology by about four decades and, more, incorporate the notion of competition among mental orders that have recently come to the fore in the

expressions of those such as Holland and others (1989)<sup>10</sup>. What is attempted below is a summary of the propositions that Hayek presents in his book. It will then be noted that the notion of a structure that guides the evolution of mental order, as put forth in these deliberations, is not fully followed through in Hayek's later writings on cultural evolution.

Hayek (1952) conceives of the mind as an order that attempts to reflect, though not with perfect success, salient features of the physical world, thereby enabling the organism to adapt to its surroundings(16). Accordingly, the psychologist's task is seen as one of reconstructing the process by which the organism classifies physical stimuli in its environment (7). In this, Hayek distinguishes his approach from that of Behaviorism: In noting that Behaviorists of his time dispensed with subjectively experienced mental qualities to concentrate on studying responses to external stimuli, he concludes that "behaviorism thus treated the problem of the mind as if it were a problem of the responses of the individual to an independently or objectively given external world; while in fact it is the existence of a phenomenal world which is different from the physical world that constitutes the main problem" (28).

In attempting to reflect on the physical world, the mind is seen to be guided by perceptive predispositions built up over the course of phylogenetic and ontogenetic development. Sensory perception is considered an act of classification, an interpretive placing of something within the context of an order so derived. As Hayek puts it, in the

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<sup>10</sup>See: Section fl-B

course of its development, the organism "builds up a system of differentiations between stimuli in which each stimulus is given a definite place in an order, a place which represents the significance which the occurrence of that stimulus in different combinations with other stimuli has for the organism"(42). The mental order, thus, is built up of elements that can evoke each other in a particular way: "An order involves elements *plus* certain relations between them, and the same order or structure may be formed by any elements capable of entering into the same relations with each other"(47). Hayek goes on to note that "such a system of connexions<sup>11</sup> which is structurally equivalent to the order of the sensory qualities will be built up if, in the course of the development of the species or individual, connexions are established between fibres in which impulses occur at the same time"(52). Contending that it is such connections between physiological events that set the basis for mental phenomena, Hayek concludes that "it is the structure of [the organization of] that field which determines the peculiar functional significance of the individual impulse, or group of impulses, which we know as their sensory qualities" (77).

If perception is thus an act of classification based on connections that the organism has developed, it rests only on a model of the external world. The order which the linkages create in the central nervous system constitutes an imperfect and perhaps erroneous 'map' of the relations which exist between corresponding physical stimuli.

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<sup>11</sup>"connexions" is an alternate (British) spelling of connections.

These maps are subject to continuous though gradual change (108). How change is effected within these maps, however has to be described in terms of their structure.

Hayek's conception of mental architecture is strikingly similar to the one that we have proffered in that it contemplates relative levels of rules which guide perception and which in turn are evaluated by their usefulness in enabling the organism to adapt to its environment. It is thus consistent with an evolutionary account of the development of institutions where competition at each level is conditioned by the rule level above. To make our point, we present extended excerpts from *The Sensory Order*. As to the relative levels of rules, Hayek notes that

[w]e should have to think of the whole system of connexions as consisting of many vertically superimposed sub-systems which in some respects may operate independently of each other. Every sub-system of this kind will constitute a partial map of the environment and the maps formed at the lower levels will serve for the guidance for merely a limited range of responses, and at the same time act as filters or preselectors for impulses sent on to the higher centers, for which in turn, the maps of the lower levels constitute a part of the environmental 11)

This provides a statement of the architecture on which mental order is based. He continues,

... the main significance of any new stimulus will be that it will alter the general disposition for responding in particular ways to further stimuli, and that less and less of its effect will consist in producing a specific response. ... As we reach

higher levels, the classification of the impulses becomes thus less specific to a particular function, and more general in the sense that it will help to create a disposition to a certain range of responses to an ever-growing variety of stimuli (113).

Here we see that higher orders limit the range of lower orders. Further, the semi-permanent map, as an apparatus for classification and orientation,

represents the kind of world in which the organism has existed in the past, ... [providing] no information about the particular environment in which the organism is placed at the moment. ... This semi-permanent structure provides the framework within which ... the impulses proceeding at any time are evaluated. ... This structure itself in turn is liable to change as a result of impulses proceeding in it, but relatively to the constantly changing pattern of impulses it can be regarded as semi-permanent (115).

Institutions of thought are thus viewed as being *driven from behind*. They provide the context for perception while at the same time their structure is subject to reevaluation with regard to their adaptive capacities. As Hayek concludes, the mental model

will, as a result of its own operations, continuously change its structure and later the range of operation of which it is capable. ... And it will as a result of 'experience' acquire the capacity of performing entirely new actions. Its actions will appear self-adaptive and purposive, and it will in general be active in the sense that what at any given moment will determine the character of its operation will be the

preexisting state of its internal processes as much as the external influences acting on it (122).

To reiterate,

..the experience that the classification based on past linkages does not always work ... forces us to revise that classification. In the course of the process of reclassification, we not only establish new relations between data given within a fixed framework of reference, i.e., between the elements of given classes: but since the framework consists of the relationship determining the classes, we are led to adjust that framework itself (168).

### **3. Extensions from Sensory to Social Order in Hayekian Theory**

In a later effort, *Studies in Philosophy, Politics, and Economics* (1967), Hayek draws the comparison between the organization of the mind and the organization of society. Both are considered to be complex and evolving polycentric orders that appear to bring about a purposive adaptation to circumstances without the benefit of central direction. As such, notes Hayek, it is not to be confused with the relationship between the mind and the body where the former directs the actions of the latter (73).

Hayek, finding the comparison between the mental and social orders fruitful, invokes it again in *Law, Legislation and Liberty I* (1972, 5), though including, in this instance, group-selection arguments. He notes here that "[t]he mind does not so much make rules as consist of rules of action, a complex of rules that is, which it has not made, but which have come to govern the actions of individuals because actions in accordance with them have proved more successful than those of competing individuals or groups" (18). Selection among competing mental representations, following in this vein, would accordingly be made on the basis of their usefulness to society in its competition with

other societies rather than to the person concerned in his dealings with his immediate environment. Such a consideration goes against the overall individualistic thrust of Hayek's arguments.

To assess Hayek's claim, we must look more closely at the mechanics of group selection and of the connection between competition at the level of groups and that between the mental constructs of individuals. One must consider that just as a given level of judgment may condition the competition among lower orders of mental innovation, so selection among groups on the basis of social rules has to be qualified with the appropriate rules of competition<sup>12</sup>. Competition among groups must properly be thought of in terms of a comparison of the efficacy of alternatives among the appropriate level of social institutions within the context of certain conditions as prescribed at the next higher level. As such, group selection, as a selection of beneficial characteristics at the collective level, cannot be considered to play an active role in the selection from among an individual's mental innovations; indeed, as a conditioning mechanism governing the selection among mental innovations, the dynamics of group level selection can, from the viewpoint of psychological adaptation, effectively be ignored. While changes in group characteristics, based on inter-group competition does ultimately affect individual behavior and learning, the pace of this change can, with the exception of revolutionary circumstances, be considered to proceed at such a deliberate pace as to be considered to be a part of a stable institutional framework. Changes at the higher group level would

be of significance to the shaping of mental models only indirectly through changing various intermediate levels of social rules.

In considering the order of the mind, Hayek acknowledges that its higher centers act to predispose the organism towards selecting certain representations of the external world over others. If such classification is not of significance, then there is a revision of that portion of the framework. His conception of the mental order can thus be thought in terms of mechanisms that condition the terms of competition within each level of its framework, effecting only those connections that are in concordance with its current orientation. As we will see in further detail in Part IV, this notion of conditioned competition, central to an understanding of *The Sensory Order*, is not fully followed through in Hayek's later writings on social institutions.

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<sup>12</sup> The emphasis on constraints that condition the form of competition is core to Vanberg's reinterpretation of Hayekian Cultural Evolution. A full exposition of Vanberg's views on this matter is pursued in section III-B-5

#### *D. Economic Interpretations of Evolution, Behavior and Knowledge*

The Constitutional perspective, in focusing attention on the constraints within which adaptation occurs within and among frameworks, provides a unified and consistent approach to understanding order and change in behavior and knowledge. In turn, this provides the evolutionary, behavioral, and epistemological basis for understanding social phenomena. At the same time, issues of order and change in social institutions can also be understood in terms of adaptation within constraints. While the extension of the Constitutional perspective to the social realm is pursued in Part III, other attempts at forming economic interpretations based on apprehensions of various evolutionary theories and on behavioral and cognitivist psychology are first evaluated below.

##### **1. American "Old" Institutionalism**

In the social science literature of the late nineteenth and early twentieth century, prominent figures, such as Herbert Spencer, Walter Bagehot, and Alfred Marshall, referred to biology as the foundation for social phenomena. Indeed, modern evolutionary economists are fond of pointing out that Marshall spoke of biology based theory as the mecca of economics towards which construction of static models was to be but the first step. Yet as economists became bogged down in the development of neoclassical models, they were soon taken to task for failing to incorporate evolutionary considerations in their theoretical work. The Old Institutionalists, comprised of Thorstein

Veblen, John R. Commons, Walter H. Hamilton, Wesley Mitchell, and Clarence Ayers, were a diverse and eclectic group who found common ground in their opposition to the developing neoclassical viewpoint. The diversity of their viewpoints and the confinements of our space leads us to consider as a sample a brief overview of Veblen's articulate critique of neoclassical economics and his own institutionalist approach.

Veblen characterized Marginal Utility Theory as being "wholly statical" in character and noted that its promulgators had not contributed to an appreciable theory of "genesis, growth, sequence, change, process, or the like"(1909, 620). Further, he questioned the psychological premises of neoclassical models, the "hedonistic conception .. of man" which depicts him as "a lightning calculator of pleasures and pains"(1919, 73).

Veblen instead directed us to examine institutions which he defined as the "settled habits of thought common to the generality of men"(1909, 625), the principles of which lend stability to their lives. Such institutions, which serve as the stimulus and guide to individual behavior in determining the range and attractiveness of alternatives that are open, were seen to be imperfectly reproduced or internalized through habituation. As Veblen put it, "[t]he growth and mutations of the institutional fabric are an outcome of the conduct of the individual members of the group, since it is out of the experience of the individuals, through the habituation of individuals, that institutions *arise*" (*Ibid*, 627).

Veblen's approach presents both evolutionary and psychological aspects. An evolutionary theory, held Veblen, must be capable of explaining in non-teleological terms the process of cumulative change through which institutions evolve. For economics to

claim to be up-to-date, such a view point was deemed necessary. In its psychological mien, Institutionalism largely takes the perspective of what we identify today as behaviorism. Veblen grounded the basis of human action in institutional structures rather than in individual preferences which he considered to be derivative or unreliable due to their subjective nature. At the same time, he noted that individual human beings are an important source of change particularly when they struggle against the boundaries of the institutions within which they are born.

Criticism of Veblen's views are derived from his consideration of the economy and of the individual as a part of an evolving cultural entity and from his behaviorist psychological concerns. Mäki (1993) considers Old Institutionalism as holist in that explanations of economic phenomena and institutions are phrased in terms of collective entities rather than in terms of the properties of individuals. If so, this could lead to the confusion of habituation, in Veblen's usage, with the internalization of social norms which form the core of role theory in Sociology<sup>13</sup>. Langlois (1986) criticizes Veblen for arguing for a kind of proto-Skinnerian behaviorism in wishing to rid economics of any sort of human intelligence and purpose. He considers that this conflict between humanistic rhetoric and behaviorist psychology has vitiated the promise of his evolutionary alternative to marginalism.

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<sup>13</sup> For a detailed critique of Sociological role theory, see Shivakumar (1989).

## 2. The Schumpeterian tradition

### a. Evolution:

While neoclassical economics shows how a system adapts when one or several parameters are changed exogenously, Schumpeter recognized that economic development is a process that originates from within the system (Schumpeter 1942, 82). He therefore concentrated on the dynamic processes driving the system, in turn, placing economic life in a historical and evolutionary context. Conversely, this implied that in an evolutionary context, the concept of equilibrium is unknown. Entrepreneurship, noted Schumpeter, destroys equilibrium from within; instabilities produced by innovation cause old elements in the economy to adapt or drop out. Thus, he concluded, "there is, though instability of the *System*, no economic instability of the *Order*" (Schumpeter 1928, 384).

The evolutionary aspects of Schumpeter's work consist of endogenously produced change and self-transformation driven by innovation. Schumpeter's legacy has thus been a tradition of research on the changes of aggregate economic activity under the influence of an incessant, and possibly discontinuous, flow of innovations.

### b. Entrepreneurship and Innovation

Schumpeter developed a theory of economic development where endogenously produced change leads to a perennial gale of restructuring and expansion. This is brought about by pioneering entrepreneurs who innovate by recombining resources. Thus, economic change is systematically produced from within the economy.

Entrepreneurship, neither an occupation nor a profession, is considered to be a rarely found capacity for carrying out new combinations of resources, which is termed "innovation"(Schumpeter 1947, 152). Such entrepreneurial activities are understood to give rise to an incessant competitive restructuring of the economy. Economic change is thus predicated on the personality and motivation of the entrepreneur. As such, it is not the creation of new ideas but rather in their implementation that the essence of the entrepreneur is found; as Schumpeter notes, "[t]he inventor produces ideas, the entrepreneur "gets things done, "...It is in most cases only one man or a few men who see the new possibility and are able to cope with the resistances and difficulties which action always meets with outside the ruts of established practice" (*Ibid.*). It is only the rare gifted entrepreneur who is capable of breaking barriers and shepherding new ventures. Once such initial hurdles have been breached, less talented and more imitative businessmen enter the field, boosting economic activity.

### **c. Neo-Schumpeterian approaches**

Neo-Schumpeterian approaches pose challenges to orthodox economics by providing insights into the role of innovation and entrepreneurship, into the process of diffusion through imitation and its impact on business cycles, into how markets function, and into how growth occurs in real economies. Indeed, the Schumpeterian tradition has been so prolific that it is sometimes identified with evolutionary economics. We consider here but a meager sample.

Nelson and Winter (1977) have pointed to the cumulative nature of technological advance, in stressing the importance of tacit knowledge gained from experience in production and marketing and have noted that the firm rather than an individual may often act as the locus of such accumulated wisdom and innovative zeal.

Accumulation of knowledge within firms or by individuals does not preclude the importance of innovations produced in symbiotic or cooperative settings. Lundvall and others have developed the theory of "national systems of innovations" to focus attention on the process of creation and diffusion of innovations within specific national economies. Production of scientific knowledge is considered but one condition of technological change. For example, Freeman (1984) has studied the nexus of Japanese government policy, corporate research and development and industry structure, and educational and cultural institutions to come up with a "socioeconomic paradigm" to explain that nation's perceived technical and economic efficiency (McKelvy 1994). Such efforts are seen to enable a rational basis for policy that targets sectors thought critical for innovation and progress.

Finally in our brief survey, Iwai (1983) has noted that firms' imitation activities constitute an equilibrating force which insinuates the industry's state of technology towards a neoclassical equilibrium whereas the function of innovation lies in upsetting this equilibrating tendency. He concludes that the evolution of industry's state of technology reflects this tension and that thus equilibrium will not be reached even in the long run.

#### **d. Criticisms**

Schumpeter's conception of innovation is broad in the sense that it encompasses organizational, financial, managerial, as well as technical innovation. On the other hand, it is narrow in that it scarcely discusses the origins of innovations and the interplay between science and technology. Rather, innovations are attributed to individuals gifted with extraordinary intelligence and drive. This conceptualization, notes Freeman, is lacking in depth and historical perspective (1990, 23).

Schumpeter's theory of novelty is weak in that it trivializes the role of invention and overemphasizes that of entrepreneurship. Indeed, Schumpeter's concern was not with invention, something deemed to be in ready supply, but rather with innovation. As Witt observes, "fundamental doubts may be raised as to whether the exclusive reliance on the figure of the entrepreneur in Schumpeter's early approach is overdoing the personalization sometimes to a point where it resembles an elite theory. A theory of entrepreneurship alone, important as it may be, indeed seems too narrow a basis for evolutionary economics...."(1993, xv).

Schumpeter overemphasizes the role of spectacular innovations and underrates the importance of small scale changes in affecting the direction of change as stressed by those who study path dependencies. More, the history of technology exhibits the legacy of not only outstanding individuals but also those of innumerable minor contributors as

well as the role institutions have played in the accumulation, use and dissemination of knowledge (Basalla, 1988).

Although change in Schumpeter's theory is driven from inside, this driving force is attributed to specialized avatars. As such, evolutionary analysis in the Schumpeterian tradition does not rest on a robust account of human psychology. In addition, it does not fully exploit appropriate metaphorical inferences that can be drawn by considering evolutionary theories in biology and psychology.

In sum, in stressing the marketing of innovation, short **shrif**t is given to how and why new knowledge is generated, what the nature of such knowledge is, how the framework within which such innovations are carved itself evolves, and to the role of experimentation and adaptation among individuals. Instead, the narrow technology and industry orientation that flavors the Schumpeterian tradition limits its heuristic potential.

### **3. Evolution, Behavior, and Knowledge in Firm and Industry Theory**

#### **a. A.A. Alchian**

Debate about the economic analogue to Natural Selection was stirred again by Alchian's essay on "Uncertainty, Evolution, and Economic Theory"(1950). Alchian suggested that economic processes embodied the principles of evolution with the economic system adopting from among innovations generated by agents in pursuit of success or profits: "Among all competitors, whose particular conditions happen to be the

most appropriate of those offered to the economic system for testing and adoption will be "selected" as survivors"(213). Alchian claims sufficient profitability as the criterion for survival. "This," notes Witt (1986) wryly, "may well be true, yet the criterion does not, as such, say very much."

#### **b. H.A. Simon**

We return to Simon, though here in his capacity as an economist: Simon has challenged the neoclassical concept of rationality as not being consistent with developments in cognitive psychology. In particular he notes that its formulation makes heroic assumptions about man's ability to gather all relevant information needed to make an informed decision. Since the boundaries of knowledge needed for this procedure are limitless, it can only be met by an "Olympian rationality" (1984, 48), he avers. His alternative, dubbed "bounded rationality," holds "that human beings handle this difficulty by attending to only a small part of the complexity around them," by basing action on a "highly simplified model of the *world*"(*Ibid*). Given that the decision-maker's personal model of the world encompasses only a minute fraction of the relevant characteristics of his environment, inferences drawn are necessarily subjective and limited. The models that generate such inferences are, in turn, a product of the actor's past experiences involving trial and error with cues signaling progress or failure playing the same role in problem solving as in biological adaptive processes. By this form of behavioral

programming, actors are seen to adopt a repertoire of behavioral patterns and problem solving skills (1979, 81).

Simon (1962) notes that individuals deal with the complexity of their environment by breaking it down into interrelated subsystems which form part of a cognitive hierarchy that make up the mental model. Human problem solving, then, operates at the level of these subsystems where they are tested for relevancy without upsetting the overall architecture.

Simon views firms as another example of such an architecture. Firms, notes Simon, are also constructed as hierarchies composed of interrelated subsystems. In addition, firms, or their constituent departments, are seen to *satisfice*, though the search for new alternatives is induced when performance falls short of certain "aspiration levels" (Simon, 1959,263). One may gather then that just as an individual decision maker's model of the world encompasses a small fraction of all the characteristics of his environment, and which has been adapted such as to capture those elements deemed necessary through past experience, just as the architecture of this construction is made up of subsystems which can be tested without restructuring the entire edifice, and just as such subsystems are maintained if satisfactory and are adjusted only in the face of failure, thus precluding maximization in any sense, so too is the case for the firm and its organization.

**c. R.R. Nelson and S.G. Winter**

The threads of Simon's arguments, which are gathered immediately above, are the basis for the contributions of these authors. Nelson and Winter (1982) note that "the capabilities of a firm are embedded in its organizational structure, which is better adapted to certain strategies than to others. Thus strategies at any time are constrained by organization. But also a significant change in a firm's strategy is likely to call for a significant change in its organizational structure"(37). Planned actions in firms are seen to be governed by the routine application of simple decision rules. These rules are changed from time to time through the operation of selection mechanisms (*Ibid*, 4). As Winter (1971) has noted, "[f]irms *satisfice* with respect to decision rules. That is if decision rules are functioning well, the firm is unlikely to change them; if not, the search for better rules will be stimulated"(245). The selection mechanism operates through the market in signaling the profitability or loss of the firm. Thus, theirs is a synthesis of organizational, behavioral, and evolutionary theories.

What a firm does and how it accomplishes it is seen to be guided by routines. These ways of doing things come into being when certain practices give results that are at least satisfactory. When routines so *satisfice*, the behavior that accompanies the routine gains significance wherein the people that staff the firm are taught which routines are appropriate for which circumstance. This routineization of activity serves as a form of storage for the firm's operational knowledge. Standardization of certain types of routines facilitates the carrying of skills by employees across jobs and serves to make expectations and norms uniform across organizations. It is such routines which are mimicked by

others and built upon when successful or experimented with when performance falls below certain acceptable standards. However, complex organizational routines make discerning which routines to adopt or edit a tricky task (Nelson, 1994). In sum, though, routines are considered to be heritable, selectable, and augmentable.

Nelson and Winter (1980) note that firms innovate at a higher rate in response to changes in market conditions. Winter (1971) notes that "while decision rules themselves are the economic counterpart of genetic inheritance, the failure stimulated search process apparently has no analogue in biological evolution"(245). However, recent research in evolutionary biology has shown that mutagenic processes operate differently under normal and selective conditions.<sup>14</sup> Evolutionary theory does not require that mutations occur at a constant rate, only that mutations arise at random with respect to their usefulness. More, an appreciation of how mental models adapt, as outlined in the previous section, provides an approach that unites biological, psychological and economic adaptation without need to resort to dubious Lamarckism. We attempt to uncover this and other such errors in analysis in the following section.

#### **4. Errors in Analysis in Evolutionary Economics**

While equilibrium theory appears to account for order in society, it does not adequately account for change. Efforts in Evolutionary Economics have, in part,

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<sup>14</sup> See: Elizabeth Culotta, "A Boost for "Adaptive" Mutation" *in Science*, vol. 265, 15 July 1994, pp. 318-319. This issue also presents two articles that challenge the view proposed by British geneticist John Cairns that bacteria could "choose" the mutations they acquire. The papers show that though a distinct type

attempted to fill this void. In reconciling the issue of order with that of change, some such efforts have tried to harmonize equilibrium theory with evolutionary analysis, though with mixed results.

Errors, inevitable, in extending evolutionary theories into equilibrium economics fall broadly into three categories: Some accounts reveal a macédoine of both equilibrium / maximization and evolutionary aspects, others have used theories whose standing in biological circles is discredited or at best dubious, while still others confuse the parallels and complementarities in biological and psychological adaptation. Some fall prey to more than one such error. We strive to provide illustrations below of attempts to square the circle. Finally, we also lay out why neither arguments for group selection nor Lamarckian constructions need be included in explanations of evolutionary change.

#### **a. Mixing equilibrium and evolutionary concepts**

Matthews (1984) distinguishes between optimizing, which he refers to as "successful attempts to make the right choice, where success, moreover, is not just a matter of chance..."(92), and competitive selection, which is considered to operate by "indirect social choice through changes in relative weights of different decision makers, brought about through the working of the system"(*Ibid.*). He goes on to note that optimization will fail where there is defective knowledge; "In circumstances where defective knowledge prevents rational foresight and learning from achieving the right

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of mutation is at work under severe selective conditions, useful mutations do not arise at a faster rate than non-useful ones.

decisions, adoption of the *right* choice throughout the economy will come about only, if at all, through competitive selection" (*Ibid*, emphasis added). Matthews goes on to note that while optimization maximizes utility, competitive selection "maximizes survival"! A polite critic of Matthews might pose the question of what standard he refers to against which defective knowledge and right choices are made. A less inhibited questioner may ask if he is not in essence calling optimization a successful extension of previously adapted behavior and the selection process a part of the search for alternatives prompted by failure as subjectively judged. If so, Matthews is not saying much. Puzzling also is that selection is contemplated only at a social level and not first at the level of mental models.

## **b. Using unsound Biological theories**

### *i. Punctuated Equilibrium*

Gowdy (1985) cites Stephen Jay Gould in arguing that just as saltation occurs in nature, then so it is with economic entities that "persist more or less intact for relatively long periods only to be replaced by sweeping new innovations"(322). However, Gould has himself changed his views on the subject several times. In 1972, Eldredge and Gould, noting that the fossil record did not show gradual change but rather uniformity with changes across gaps or breaks, introduced the notion of *Punctuated Equilibria* as an alternative to phyletic gradualism. Later, in 1980, Gould de-emphasized organic mutation and toyed with the notion of macromutations with species changes occurring in

one or two generations. Still later (198), Gould pulled back from this extreme position. He rejected as illegitimate forms of macromutation which include sudden origin of new species with all their multifarious adaptations intact and turned to considering phenotypic shifts caused by "small genetic changes that affect the rate of development in early ontogeny with cascading effects thereafter" (88-89). In short, punctuated equilibrium has been called into question as a biological theory by its own progenitors. Its extension into economic analysis is thus suspect.

#### *H. Group Selection*

Hirshleifer (1982) views human cooperation within groups as motivated by competition against other groups for resources amid pervasive scarcity; "in-group cooperation is only a means for more effectively and ruthlessly competing against outsiders and even within the group there will not be perfect parallelism of interests, hence cooperation must generally be supported by sanctions"(50). Accordingly, he notes, the test of a group's constitutive law is whether it makes the group a more effective competitor. Thus, "[efficiency, in this interpretation, is meaningful only as a measure of group strength or advantage relative to competing groups in the struggle for life and resources"(*Ibid.*).

Hirshleifer presents a model where societies consist of individuals banded together to fight other societies over scarce resources. Those groups that excel at seizing assets by maintaining greater internal discipline are considered to possess more efficient rules. Apart from the group selection aspect of his argument, which will be taken up in

turn, there is also here a confusion of evolutionary and neoclassical style thinking. The concept of scarcity is characteristic of static General Equilibrium models where resources and technology are fixed; Economics in this tradition is taken as a struggle for control and management of such resources. Such thinking is not compatible with the suggested subjectivist - evolutionary approach where the eye of the beholder, based on his or her experiences, determines what constitutes a resource and where innovations, though subject to some selection process, are generated endogenously. (It is not therefore argued that scarcity does not exist, nor that groups do not compete for resources; rather, the point is that what one values and thus seeks keeps changing and that and that what one may consider a scarce resource changes alongside.) Though he proposes that rules are selected through group competition, Hirshleifer is vague in describing how rules within his social groups are generated.

Although Hayek presents a more organic and individualistic theory of evolution, he too falls prey to group selectionist arguments. Hayek notes that human social orders are based on the sharing among its constituent members of, first, innate, genetically transmitted rules of behavior that have been shaped by biological evolution and, second, learned, culturally transmitted rules( 1967,66). While innate behavioral rules can be considered to be stable for the purposes of economic analysis, the variability of cultural rules is of significance. Hayek stresses the spontaneous nature of the emergence of cultural rules and orders. However, such rules, emerging as the unintended outcome of individuals separately pursuing their own ends, are subject to a process of selection

among cultural groups. Thus, "the present order of society has largely arisen, not by design, but by the prevalence of the more effective institutions in a process of competition"(1979,154). He goes on to note that present cultural institutions are "the result of a process of winnowing or sifting, directed by the differential advantages gained by groups from practices adopted for some unknown and perhaps purely accidental reasons" (*Ibid*, 155).

In his critique of Hayek's theory of cultural evolution, Vanberg (1986) notes that the same arguments that have discredited group selection in biology hold as well in the context of cultural group selection. The issue, he considers, is not whether individuals in groups that practice more appropriate rules are better off than individuals in other groups but rather that "within the groups those bearing the costs of socially beneficial but self-sacrificing behavior would be relatively *worse off than* those who free ride, who enjoy the group advantage without sharing the costs of its production"(87). For example, those who selflessly protect the group from outside invasion are more prone to die whereas those who benefit from this protection would more likely survive. He stresses that maintenance of group beneficial behavioral regularities require conditions within the group that are advantageous to the individual in carrying out such actions. Further, he points out that the challenge implied in Hayekian evolution lies in explicating the circumstances under which individual innovation and imitation can be expected to generate socially beneficial rules (*Ibid*, 82; 1994,319).

### **c. Lamarckism in Biological and Psychological Adaptation**

Biological and psychological adaptation processes are characterized by both complementarity as well as parallelism. The complementarity between the two, as has been seized by Hayek and noted above, rests on psychological adaptation taking up where biological evolution leaves off. The parallel between the two forms is based on the similar processes of innovation and selection of behavior at the phylogenic and ontogenic levels. Given this basic understanding, it is puzzling to encounter Lamarckian explanations of adaptation in the literature on evolutionary economics.

The distinction between Lamarckian and Darwinian theories of evolution are as important in the social sciences as they are in biology. Lamarck held that the germ plasm of an individual organism is altered by the individual's life experiences. Such acquired characteristics were then transmitted to its offspring. For example, the long neck of the giraffe is explained by successive generations of the animal stretching its neck to reach tree foliage, its source of food (Gordon, 1993, 428). On the other hand, and keeping with the example, natural selection holds that the long neck of the giraffe is a cumulative result of higher survival rates among members of the species who inherited slightly longer necks than other giraffes. The natural selection version has been borne out by investigations in genetics.

While an individual's cognitive outlook can be modified by life experiences, it is similarly driven from behind. Transmission of behavioral propensities, is reliant on, first, conditioning by particular individuals, second, by the social order they foster, and third,

by the chosen physical environment. In this light, consideration of the inheritance of acquired characteristics as being Lamarckian by such analysts as Nelson and Winter (1982) and Boyd and Richardson (1980) is unnecessary. The point is that the ontogeny of behavioral adaptation can be understood as complementary, while similar in process, to the phylogenic mechanism. Both can be grasped within the skein of Darwinian evolutionism. The need, thus, to introduce discredited Lamarckian explanations of evolution in attempting to understand change in cultural norms is obviated.

### III. Order and Change in Social Constitutions

As we noted at the outset, this thesis focuses on how the Institutional-Constitutional outlook can be integrated into a broader framework that includes a particular theory of knowledge and behavior within an evolutionary perspective. In the previous part, we laid out the elements of this perspective. In this part, we seek to show how this theory of structure and modification in human behavior and knowledge can lead to an understanding of order and the mechanisms of change in society.

Accordingly, we begin our exploration in this part by gathering the common threads in the institutionalist accounts to gain an understanding of the purposes, origins, structure, and nature of change in social institutions and orders. In doing so, we owe much of our understanding to the emerging research program of *New Institutional Economics*. As such, however, we do not contemplate a full survey of the literature it has subscribed<sup>15</sup>. We then supplement this institutionalist approach with the insight of *Constitutional Political Economy with* respect to evolution within constraints.

We then apply this fortified understanding to clarify, provide illustrations, and gain insights into issues relating to order and change in social institutions: We examine

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<sup>15</sup> A survey by Langlois: "The New Institutional Economics: An Introductory Essay" as well as essays in New Institutional Economics can be found in *Economics as a Process, Essays in the New Institutional Economics*. Also, Mäid's essay "Economics with Institutions : Agenda for Methodological Enquiry" in

in turn issues of order and change within market settings, within scientific communities and in social constitutional frameworks. These illustrations, in turn, demonstrate that a theory explaining order and change in social institutions can be consistent with the particular vision that also describes the evolution of biological species, the development of behavior and the growth of knowledge structures.

## *A. Rules, Institutions and Orders*

### **1. Institutions and Rules**

What distinguishes a social institution from a rule or group of rules from which it is constituted? A social institution broadly serves two complementary functions: It *reduces uncertainty and promotes coordination and cooperation* among individuals. In this sense, it is a configuration of interconnected rules, socially considered. These dual roles are consistently invoked in the analyses of institutions by diverse authors.

According to Lachmann (1971), individuals in a group governed by the same rules find not only their range of action limited but also those of all other rivals. This permits individuals to anticipate with greater confidence what the other will do (61). In this way, each person can rely on the actions of anonymous others while remaining in ignorance of their purposes and plans. As Lachmann puts it, "[t]hey are the nodal points of society, coordinating the actions of millions whom they relieve the need to acquire and

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*Rationality, Institutions & Economic Methodology* provides a useful summary of the various flavors in

digest detailed knowledge of others and form detailed expectations about their future action"(50). Brennan and Buchanan (1985) echo these concerns. They note that by setting out the informational boundaries for the actions of others, rules provide predictability about the behavior of others; "Individuals are recognized to possess their own privately determined objectives, their own life plans, and these need not be common to all persons. In this setting, rules have the function of facilitating interactions among persons who may desire quite different things"(7). Again, Langlois (1986) suggests that by constraining the range of possible actions, institutions foster the possibility of forming reasonable conjectures of others' actions and thereby heighten the possibility for plan coordination. He goes on to note that social institutions are "interpersonal stores of coordinative knowledge ... [that] serve to restrict at once the dimensions of the agent's problems-situation and the extent of the cognitive demands placed upon the agent"(237). Finally, North (1990) holds that institutions include any formal or informal constraint that reduce uncertainty by structuring life - "In consequence, they structure the incentives in human exchange..."(3).

In attempting to distinguish a rule or a group thereof from an institution, we have noted that institutions play the role of promoting predictability and, conversely, reducing uncertainty by confining the scope for activity and that this in turn promotes coordination within a protected domain of action.<sup>16</sup> What, however, is the character of

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Institutional Economics.

<sup>16</sup> Rules that create confidence in one domain of action can lead to confusion in another. For example, rules and rule change mechanisms that govern some bureaucratic and political establishments can inhibit

such institutions that distinguish them from mere rules? For a rule or a complex of rules to be considered as an institution, it must be *reliable, recognizable, and of general applicability*. As to the first two points, Lachmann notes that "[i]n reducing the uncertainty of the future which enshrouds all human action, and helping us overcome the limitations of our ignorance of the present, [the] coherence and permanence [of social institutions] are indeed of primary importance" (1971, 70). His allusion to "nodal points," quoted earlier, draws attention to the necessity that all those who are affected by the rules in question be aware of what they are. He concludes that the reliability and recognizability of institutions is diminished if the foundation upon which they are based is subjected to whimsical change as they would lose their "capacity to serve as means of orientation in relating to the action of others"(72). Hayek (1960), referring to the institutions of the state, stresses that for rule additions to such institutions to be reliable, they must be determined unambiguously and consistently under a permanent legal framework in order to afford the individual the ability to plan with greater confidence (222). In his essay, *Economics and Knowledge* (1948), he addresses the issue of recognizability in noting that the coordination of myriad plans require that "the plans of the one contain exactly those actions which form the data for the plans of the other" (38). As regards the generality of their application, Hayek notes that "[b]eing made impersonal and dependent upon general abstract rules, whose effect on particular individuals cannot be foreseen at the time they are laid down, even coercive acts of governments become

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coordination in the marketplace. In this regard, Wade (1985) has shown how institutionalized corruption in India inhibits economic development.

data on which the individual can base his own plans"(1960, 21). Further, he argues that law should consist of a set of abstract, ends-independent rules, observed by members of the relevant social group. Such rules allow the membership of that order to exploit them for their own private purposes. The law as such is to be limited to marking proscribed areas of behavior (1973,97).

## 2. Spontaneous and Pragmatic Origins

Menger (1985) distinguishes between pragmatic and organic ways in which institutions may come into existence - by the deliberate exercise of a common will or, as an unintended result of human efforts at individual goals. Menger concentrates on the latter in attempting to answer the question: "How can it be that institutions that serve the common welfare and are extremely significant for its development come into being without a common will directed towards establishing them"(146)? The general characteristics of Menger's organic or *invisible hand explanation* is exemplified in his account of the origin of money. Through the device of conjectural history, Menger attempts to provide a general theoretical understanding of the process by which the institution under consideration could have emerged given conditions that could plausibly be considered to have existed. In such an account, given an original situation, individuals are seen to try to exploit available opportunities in pursuit of their own interests. If, as is likely at some point, some individuals discover an innovation that is advantageous, and if

others notice this and subsequently imitate their actions, the behavior will spread, become widespread, and will result in the social institution that is to be explained. Menger's account thus highlights the impromptu and decentralized aspects of the birth of general behavioral rules.

Menger's notion of spontaneous order has served as one of the foundations for economists in the Austrian tradition in their explanation of order. In both complement and contrast, Buchanan, in *The Limits of Liberty* (1975), provides a contractarian account for the emergence of legal order. Like Menger, he imagines an original condition and then conducts an exercise in conjectural history: In a natural state, each person is seen to expend resources to fend against attack by other persons. Each would be better off if such resources were directed towards production. By negotiating an agreement to limit defense and predation, law emerges with each person accepting limits to his own freedom of action and liberty. Equipped with a set of rights and informed about them and of the rights of others, the individual is in a position to initiate subsequent deals with others. Once individual rights are well-defined, recognized by all participants, and non-arbitrary, economic interchange becomes the archetype of ordered anarchy. Put another way, having defined and accepted a set of rights, individuals can reduce their investments in predation and defense and go about the business of improving their well-being through negotiated dealings with each other.

These contrasting approaches by Menger and Buchanan bring attention to the notion that while certain types of rules can be expected to emerge from an *invisible hand*

*process*, there are others which are the outcomes of deliberate processes and, more, could not plausibly be of spontaneous provenance. The contrast between these can best be viewed with respect to game theory matrices that depict coordination and cooperation (or Prisoners' Dilemma) problems. As an example of a coordinative solution, recurring problems of road traffic are resolved by drivers following the rule to always drive on one(right or left) side of the road. There is no incentive to deviate from this as any such experimentation would lead to an accident that would be punishing to the violator.

		A	
		a1	a2
B	b1	4, 4	0, 0
	b2	0, 0	2, 2

The situation consists of two or more actors facing two or more alternatives, with outcomes dependent on the actions of the other actor(s). There are at least two choice combinations preferred to all other combinations. A simple two actor matrix is shown.

(Ullman-Margalit 1977, 17ff)

Figure 2: Coordination Problem

Can such a problem-solving regularity be expected to emerge spontaneously? According to Vanberg (1986, 499), it is possible to conceive of a Mengerian-style theoretical explanation for the emergence of coordinative solutions which moreover, also tend to be self-policing or self-enforcing.

The next question is whether the solutions to cooperation problems can be amenable to an *invisible hand process*.

		A	
		don't cheat	cheat
B	don't cheat	4, 4 N, N	0, 7 N, N
	cheat	7, 0 N, N	2, 2 N, N

Such problem situations involve two or more persons each of whom faces a decision to cheat or not to cheat. The outcomes of the are portrayed on the matrix at left.

The dominant solution is the cheat-cheat cell though all participants would be better off if they could cooperate and not cheat.

(Ullman-Margalit 1977, 18ff)

Figure 3: Cooperation (PD) Problem

In the Prisoners' Dilemma (PD) case, there is a strong incentive on all participants not to choose the cooperative strategy for fear of being double-crossed by the other player. Also, even if many participants choose to cooperate, the incentive to cheat becomes more lucrative; the only thief in a community of honest folk. Behavioral regularities consistent with cooperation are therefore not self-policing. Additionally, in large number settings, reciprocity (tit-for-tat) as a mechanism for developing cooperation by disciplining cheaters breaks down because the defector may disappear into the crowd, making identification and hence retribution difficult. Thus, in this case, a deliberate and

organized enforcement is needed for the viability of cooperative behavioral regularities (Vanberg 1986b, 503).

Development of institutions through spontaneous as well as pragmatic means pose complementary approaches to the issue of their origins, notes Vanberg (1989a). More, such approaches, as can be interpreted in the works of Menger and J.R. Commons, maybe understood in terms of an individualistic methodology. As a contrast to Menger, Vanberg cites Commons as spotlighting the deliberate creation of organizational rules. Given Commons's definition of institution - "[T]he short definition of an institution is collective action in control of individual action, the derived definition is: collective action in restraint, liberation, and expansion of individual action"(1934, 73) - Vanberg sees Commons as focusing on two aspects of social rules. That which he identifies as the Theory of Property Rights points out that socially enforced rules impose constraints on the individual, but similarly on others as well thus securing a protected domain of action. The other, called the Corporate Actor theory, is taken to mean that while an individual in an organization is bound by rules and constraints, collectivized action, on the other hand, permits the realization of gains that can only be produced jointly (Vanberg 1989a, 345). The former focuses on the development and enforcement of a framework of rules within which individuals may interact while the latter pays attention to the nature and role of organized collective action, the combination of resources belonging to two or more persons to create an "acting entity." Vanberg concludes therefore that Menger's account of the spontaneous evolution of general rules of conduct and Commons's version of the

deliberate creation of organizational rules reflect different though complementary aspects of institutional reality (*Ibid* 356-357).

### 3. Coordinative Frameworks and Resultant Orders

As we have seen, institutions are based on a constitution of conditioning rules. By limiting what is taken for consideration and how it is appraised, and in enabling the individual participant to recognize patterns in his or her environment, to predict them, and to exploit them, an order can be generated.

Hayek distinguishes between two types of orders. The first, *taxis*, is an artificially created order. Being a deliberate arrangement that is relatively simple, it is limited in complexity with what its makers can contemplate. The other, *cosmos*, is a spontaneous order, with the degree of complexity not limited to what the human mind can master. As Hayek notes, "[a]ll that is necessary to preserve such an abstract order is that a certain structure of relationships be maintained, or that elements of a certain kind (but variable in number) continue to be related in a certain manner"(1973, 39). This "structure of relationships" enables the formation of a degree of complexity in arrangements that could never be deliberately accomplished, and makes use of knowledge that no individual possesses as a whole (*Ibid.*, 49). Individuals are free to choose their courses of action, based on their knowledge of time and place, within the limits set up by the framework of rules. In this way, knowledge dispersed among the membership is more fully utilized (*Ibid.*, 51). In contrast to the made order, spontaneous orders develop from relationships that have no particular purpose, although this is not to deny that particular individuals

may impute the existence of purpose as a basis for organizing their affairs within a framework.

Lachmann (1971) similarly makes the distinction between the institutional framework and the resulting order when he refers to "the undesigned institutions which evolve gradually as the result of the pursuit of individual interests accumulate in the *interstices* of the legal order"(81). In comparing a planned lattice to the organization of an institution, and considering the activities of individuals in pursuit of their interests as sediment, Lachmann is able to articulate how order is formed by leading the reader to imagine how the settlement of the sediment would be affected as it passed through the structural features of the lattice. In this way, he separates the notion of a designed *external* institution, which constitute the outer framework from that of an undesigned *internal* institution which is seen to evolve gradually as a result of spontaneous activities of individuals as guided by the institutional framework.

"Both what organizations come into existence and how they evolve are fundamentally influenced by the institutional structure", concurs North (1990, 5). While, on one hand, he defines an institution as any form of constraint devised to shape human interaction, on the other hand, organizations are considered to be groups of individuals united in the pursuit of some common goal within such confines, and, moreover to take<sup>1</sup> advantage of the opportunities that the institutions provide.

In reviewing the relationship between social institutions and orders, the reader is no doubt reminded that a distinction was made earlier (Part I) between Constitutional and

Sub-Constitutional frameworks. Given this, the notion of a structure of relationships and the spontaneous orders that generate within its interstices, as evoked above, can be considered as limited in that it contemplates only two levels of arrangements. A more general approach would incorporate the view that frameworks can be nested within others. If the patterns of order generated by one level of institutions are sufficiently reliable, recognizable and general in application, they may, in turn, serve as institutional guideposts in their own right towards the creation of successive generations of orders<sup>17</sup>.

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<sup>17</sup> For example, the United States Constitution sets up the form of government. Within this structure, the House of Representatives, for about four decades ending in 1994, was dominated by the Democratic Party. Their hold on this legislative assembly was thought to be so tight that political calculations and economic coordination were taken based on this "given." The subsequent takeover of the House by the rival Republican Party has been described in terms of a revolution.

## ***B. The Nature of Change in Institutions***

Having examined the uses, origins, and structure of institutions, we now address the nature of evolutionary change in institutions, focusing on the innovation and selection mechanisms that govern the processes by which change is effected.

### **1. Rules as Tools**

In describing rules as social tools, Hayek seeks to point out that rules are like pre-formed implements that have been refined through use to become well adapted in dealing with recurrent problems. Accordingly, he notes, "[l]ike most tools, rules are not part of a plan of action but rather equipment for certain unknown contingencies. Indeed, a great part of all our activities is also guided ... by a desire to accumulate a stock of tools and of knowledge, or to maneuver for positions, in short to accumulate 'capital' in the widest sense of the term, which we think will come in useful in the kind of world in which we live" (Hayek 1976, 23).

Given Hayek's allusion of rules as social tools and their accumulation as capital, it may be instructive to draw parallels between Austrian Capital Theory, as developed by Lachmann and a theory of institutions. Lachmann (1977; 1978) refers to the theory of capital as a morphology of forms which the structure of production assumes in a non-stationary world. By referring to a *structure of production*, Lachmann indicates that complementarity is a central concept in the use of capital; by *morphology*, he implies that there are a limited number of such complementarities that are both technically feasible as

well as significant; by *non-stationary*, he introduces the possibility of unexpected change - such that it compels a reconfiguration of the structure of capital. With this structure susceptible to unexpected reshuffling, alternatives may be substituted for particular tools in operation while others may be turned to other roles or second best uses. In this way, the nature of the factory or other productive institution, as an assemblage of tools of many uses, may through time, undergo successive adaptive changes.

Similarly, institutions, as configurations of social capital, are subject to change as rules change in their roles as complements and substitutes in the overall framework. Accordingly, cultural evolution, as we may call the process by which social rules are transformed, is not a linear process and rather depends on the complementarities that can be sought as various contingencies arise through time. As the *internal* institutions change as a result of innovative activities, the *external* institutions have to stay relevant to guide these changes while being transformed in the process as well. As North (1990) observes, as organizations take advantage of the opportunities created by institutional constraints, they evolve, and in doing so, alter the shape of the institutions themselves (6). An important balance that institutions have to weigh is then between being flexible enough to respond to changes in circumstance while remaining sufficiently coherent in order to allow the fulfillment of their role as a guide.

## 2. Darwinian Evolution

In our earlier (Section IIC-2&3) examination of biological change, we noted that evolution considers historical processes where phenotypic variation among individuals leads to differentials in reproductive success: These are processes by which novelty is generated (e.g., genetic mutation) and through which systemic selection among such variants is handled. In consequence, the distribution of variation of traits within the population is seen to shift gradually over time to reflect those traits that have conferred advantage to each of particular organisms with respect to the selecting environment. In this regard, the reader may recall Burian as considering evolution as a "transgenerational alteration of features and capacities of organisms in a lineage that enables them to solve problems posed by the environment" (1992,7). Further it may be recollected that Mayr's *population thinking* approach, in stressing the uniqueness over type, emphasized that evolutionary adaptation took place at the level of the individual.

From a Darwinian interpretation of evolutionary change, one can gather further implications in our quest to understand institutional change. First, it transfers the spotlight from spectacular but rare innovations to the smaller incremental changes that are constantly propelled by the efforts, joint or singular, of individuals to better cope with problems that they identify in their environment. Second, while the features carried forth may not necessarily prove adaptationally useful in current or future use, the prospects for adaptive success rests on the ability and opportunity of the individuals within the constituent group to generate novelty; those groupings may better survive whose meta-

institutions allow for the generation of novelty by individuals in their productive and social relations which in turn enables heightened opportunities to survive in changing environments. Third, such an interpretation returns economics to its roots in Scottish Moral Philosophy - the view that civilization is *driven from behind into* an open future by the continual efforts of innovating individuals, who, in pursuit of their own objectives and in response to new circumstances, attempt conjectural modifications to their less successful routines. Individuals who happen to come upon such better 'tools' will tend to retain them while others may seek to imitate what is perceived to be a successful adaptation; in this way, rules are propagated. Still, and this is the final point, there exists a tension between innovation and compatibility. Just as propagation of traits can only be considered if species compatibility is maintained as in the biological instance, so the current adaptive success of individuals in a group rests on the ability and opportunity for its constituents to generate novelty while preserving such levels of coordinative and other institutional features as not to invite chaos and disintegration. Hayek (1960, 29) stresses the importance of liberty to "make room for the unforeseeable and the unpredictable." This internal criterion for growth has to be supplemented by constraints such as those embodied in institutional framework which govern the dynamics of the process (Vanberg 1992,110).

### 3. Innovation and Competitive Selection Processes

As we have noted immediately above, a Darwinian explanation requires an individualistic account of the processes of variation and selection. Any extension of these principles to explain invisible hand processes would therefore have to specify these processes in terms of separate individual choices. Hayek poses that the driving force behind civilization is continuous experimentation by individuals in a bid to better adapt to their surroundings. If they find better 'tools' for their purposes, these will be retained, and possibly imitated and spread (1960, 28). Can institutions then be viewed as the outcome of an evolutionary process in which proposed alternate rules are tried out through a competitive process? A reasoned response would have to consider who or what the relevant individual or entity is that carries out the innovating, at what level the competition occurs and, what the terms of evaluation in the competition among rules are. The figure (3) below provides a matrix of possible combinations between the entities that experiment and those that are involved in the selection processes.

As we noted in the section dealing with biological evolution, what constitutes an *individual* is defined by the process of selection. That is if selection can be split into competitive interaction with other units as well as propagation of the useful innovation, individual adaptation can be considered to be engaged with both properties. In the present context, the term, 'individual', may refer to particular persons or groups thereof;

		selecting	
		individual	collective
experimenting X^		private	public
		individual	collective
private	4	1	2
	public	7	8
		3	9
		collective	collective

Source: Vanberg 1992, 117

The matrix illustrates that "the modes of experimenting and selecting can, to some extent vary independently, and that different combinations that are possible may have significantly different implications for the nature of the process by which institutions/rules change and evolve" (*Ibid.*, 116).

Figure 4: Institutional Experiments

the key distinction being that they be viewed as *carriers of rules*. As such, these "entities compete for resources or rewards, and the rules or rule-configurations that they adopt are seen as instruments by which they compete" (Vanberg and Kerber 1994, 196). Competition among rules thus takes place between and among individuals and groups as governed by more fundamental levels of rules and institutions. Social institutions, as we have noted, are made up of a configuration of rules and each group may adopt different rules and/or may configure them differently. Institutions thus can be of variable assistance in directing the entities that adopt them to be more or less successful in

generating growth or social surplus (as they may define it.<sup>18</sup>) Having said this, however, we must guard against slipping into group-selectionist arguments; this distinction is pursued below.

#### 4. Critiques of Hayekian Cultural Evolution

Hayek's Theory of Cultural Evolution is an attempt to interpret the emergence of rules and institutions that contribute to a beneficial social order through an evolutionary lens. According to this perspective, "the present order of society has largely arisen, not by design, but by the prevailing of the more effective institutions in a process of competition" (Hayek 1979, 154f). As such, institutions, the "structures formed by traditional human practices," come about as "the result of a process of winnowing or sifting, directed by the differential advantages gained by groups from practices adopted for some unknown and perhaps purely accidental *reasons*" (*Ibid.*, 155). Can Hayek's interpretation of groups as the appropriate unit in competition and of selection be found consistent with the principles of Darwinian evolution? And are the rules and institutions that survive the culling processes described necessarily desirable for the individuals involved? A resolution of these issues is preliminary to a clear understanding of how rules and institutions evolve and of what role constitutional design plays in this process.

We take up, in turn, the issues of group selection and evolutionary optimism.

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<sup>18</sup> Growth must be gauged by the evaluations of the individuals involved: It is, as Vanberg notes, "whatever best satisfies the interests and wants of the human individuals who constitute the community, whatever these interests and wants may be" (1992, 110). See Section I-B-3&4 of this paper for the bases on which these statements can be made.

### a. Group Selection and Vanberg's Critique

In his *Notes on the Evolution of Systems of Rules of Conduct* (1967), Hayek notes that "*transmission* of rules of conduct takes place *from individual to individual*, while what may be called the natural *selection* of rules will operate on the basis of greater or lesser efficiency on the resulting *order of the group*"(67, emphasis in original). Vanberg's evaluation of this claim examines whether and how the problems of altruism (noted in an earlier discussion - Section II-C-2-c) may apply here. In the biological context, without any mechanism to penalize free-ridership, that is the tendency of some members to capitalize on the activities of other members who perform socially useful but self-sacrificial tasks, any free-riders in the group are likely to expand in numbers and alter the makeup of the group (Dawkins 1976, 8). Thus, there is no explanation of how the advantageous behavior is rewarded or replicated. In the context of cultural evolution, the costs of maintaining 'appropriate' social rules within groups are seen to be borne disproportionately by some while others share in the benefits that accrue to the group without sharing in the costs of its production. Free-riders would be better off than those exhibiting the self-sacrificing behavior. Such behavioral patterns can only "persist if, and to the extent that the intergroup advantage from self-sacrificing behavior outweighs the intragroup disadvantage"(Vanberg 1986b, 86). As this contingency is considered to be remote in nature, group beneficial activity by its members is, in general, considered not to be sustainable unless such activity is also advantageous to the individual as well. In turn,0

an individualistic *invisible hand explanation* along these lines cannot be contemplated.

As Vanberg (*Ibid.*) concludes,

A closer examination of Hayek's writings on this topic reveals that, in actual fact, he neither systematically elaborates nor consistently pursues such an individualistic, evolutionary approach to the question of why it is that rules can be expected spontaneously to emerge that increase the "efficiency of the group as a whole" (Hayek 1967, p. 71) and that provide solutions to the "problems of society" (Hayek, 1980, p. 28). Rather, there is a tacit shift in Hayek's argument from the notion that behavioral regularities emerge and prevail because they benefit the individual practicing them, to the quite different notion that rules came to be observed because they are advantageous to the group(83).

As such, it is a functionalist argument, notes Vanberg, when the "contribution to the "maintenance" of a social system explains the existence of a social pattern or institution"(*Ibid.*).

#### **b. Evolutionary Optimism and Buchanan's Critique**

Another source of ambiguity in Hayek's arguments regards the desirability of surviving institutions. It is not obvious that rules and institutions that survive in the process of cultural evolution are necessarily in coincidence with what is desirable for the persons involved. This ambiguity may be rooted in that, by comparing the promises of *cultural evolutionism* against the dangers of *constructive rationalism*, Hayek is indulgent of the former while rigorous in his criticism of the latter process; indeed, his central concern is to show how voluntary and spontaneous interactions among individuals can bring about a desirable social order. To further assess this claim, we examine what he

means by *constructive rationalism* and review Buchanan's critique of evolutionism. An understanding of the strengths and shortcomings of what is portrayed as alternate standpoints will in turn lead in to a discussion of the role for deliberate design in the evolution of institutions - that is how both can be found consistent with a theory of Constitutional Design.

What is *constructivist rationalism*\*? Vanberg (1994c [1983]) identifies two meanings in Hayek's use of the concept. The first relates to the deliberate coordination as a means to achieving cooperation in society, that is as a firm or organization writ large. Hayek identifies the fundamental error here as the "fiction" that all relevant facts about society can be collected and known to a single mind and that economic activity can be planned on this basis (1960, 37; 1967, 82; 1973, 13). The second meaning relates to Hayek's objection to the notion that social institutions can and ought to be the product of deliberate design. While Hayek acknowledges that the introduction of designed elements into the framework of rules is not necessarily irreconcilable with the principles of a spontaneous order (1973, 45), he points out that a structure of rules that has evolved piecemeal through the trial and error of proposed innovations is likely to be more effective than a set of rules, a grand design, invented and set down by a single mind (1960, 66; 1967, 88).

With respect to the efficiencies of institutions that have evolved versus those of deliberate design, Buchanan notes two flaws in Hayek's arguments. First, he asserts that evolutionary processes "contain within their workings no guarantee that socially efficient

rules will emerge overtime"(Buchanan 1977, 31). We may add, from our understanding of biological evolution, that adaptations reflect attempts to adjust to past environmental contingencies and say nothing about the efficacy in current or future situations. Buchanan's second and more important criticism of the Hayekian formulation is that it fails to separate the positive and normative implications of the *invisible-hand principle*. To Buchanan, Hayek appeared to suppose that *invisible-hand processes* lead to beneficial results. Buchanan argues instead that a normative interpretation points to the neutrality of the efficiency properties of the outcomes of its process (*Ibid.* 28-31). In simpler language, we may restate that just because an outcome is the result of a spontaneous process does not imply that it is necessarily efficient with respect to some given criteria. Vanberg (1983, 203) puts it in a nutshell when he notes that "Buchanan finds Hayek's argument misleadingly to suggest that institutions which spontaneously evolved presumably are efficient, while those which have been deliberately designed tend to be inefficient" (Buchanan 1975:194; 1977:125, 293).

##### **5. Role of Constitutional Design in the Evolution of Institutions:**

Vanberg (1994a, 184) identifies two separate problems in relating success to survival within Darwinian evolutionary theory. The first, concerning the explanatory or predictive facets of the meaning of survival, is trivial: that which survives is successful. Still, if indicators of success can be identified, the notion can take on some empirical content. For example, the extent of a competitor's practice and skill in, say, tennis are

useful markers in predicting heightened chances of survival in a tournament. The second problem concerns the normative content of success and survival. For the content to be normatively meaningful, two conditions are seen to be required: "if what is "successful" can ... be identified in terms of attributes other than survival, and if these attributes are claimed to be valuable or desirable for reasons other than their mere survival" (*Ibid.*). Although more contentful, such terms are also open to interpretation and dispute. Following this distinction, *unconditional* evolutionary claims are statements about which no substantive conclusions can be drawn as to the desirability of what survives whereas *conditional* evolutionary claims specify the competitive constraints within which one can conjecture as to what is likely to be successful and hence survive (*Ibid.*, 185). This distinction is central to the Constitutional insight in that it focuses attention on the confinements within which innovations can be generated and selected. As such, the relative merits of such meta-level constraints or standards are open to debate.

Hayek's theory of cultural evolution, in the main, poses that, since we cannot *ex ante* know what solution will prove adaptationally efficient, we can learn and cope better by proposing tentative conjectures, mooted rules if you will, so that they may be selected in a competitive environment. In invoking the analogy of rules as tools, Hayek tries to make the point that rules form and spread just as tools do - through innovation of alternative modes and imitation of successful practices. Yet, as we have seen, he steps beyond the bounds of this comparison when he evokes group selection as a means by which the institutional characteristics of groups are tested against each other. Also, his

enthusiasm for cultural evolution leads him to oversell the efficiency properties of the consequences of competitive processes. Given Vanberg's and Buchanan's respective critiques, there remain two issues that need to be resolved if we are to provide a coherent theory of cultural evolution as an explanation of institutional change; we need to resolve the issue of competition among and innovation within groups other than by group selectionist arguments. Accordingly, we need to understand how alternate rules of competition may affect outcomes. Also, given that we appreciate that cultural evolution cannot *per se* produce desirable results, we need to examine what role selected constraints play. Both these issues are dealt with in Vanberg's reinterpretation of Hayekian evolutionism. To come to this point however, we must pursue his distinction between conditional and unconditional evolutionary arguments.

The issue, then, that requires clarification in the discussion of cultural evolution is not whether competition at the group level occurs but within what frameworks. Accordingly, we need to ask what the rules of competition are, how the development of such rules is conditioned, and what may be inferred about the outcomes of alternative competitive constraints. Within the group, an individualistic *invisible hand* conception of how group beneficial rules may emerge has to be made conditional: "It cannot be simply postulated that from a process of variation, based on *individual* innovations, and a process of selection, based on *individual* imitation, rules will emerge which benefit the group. Rather, one would have to show *why* and *under what conditions* the process of individual

innovation and individual imitation can be expected to generate socially beneficial rules...."(Vanberg 1986b, 81).

Among groups, competition can occur in many ways: migration of individuals from one group to another, adoption by one group by some means of collective decision making to incorporate the practices of another group, the use of force by one group to takeover another group, *et cetera*. Competition among groups has thus to be made conditional on constraints as well; some forms of competition may be thought superior to others with the competition among forms of competition similarly circumscribed by constraints. As Vanberg concludes, "[t]he basic thrust of such a conditional notion of cultural evolution is described by the idea of a process that allows, at all levels at which rules and institutions emerge or are chosen, for alternatives to be tried out, and to be exposed to a kind of competition that makes for responsiveness to the interests of the individual persons who are to live under these rules"(1994a, 189f). Vanberg's interpretation of Hayekian evolutionism envisions a clearly defined role for constitutional choice and institutional construction to provide the framework within which innovative and competitive activities can play out to the adaptational benefit of the constituent individuals.

Accordingly, the task of the analyst is to consider and propose, through innovation or imitation, conditions under which the competitive evolutionary process constraints for the relevant community. That such constitutional reforms may be

deliberate is an essential consideration in ensuring that, at each level, the directions that may be forged by the workings of evolutionary competition are reined in with respect to desirable attributes.

### *C. Order and Change in Market Frameworks*

In the previous section, we noted that social institutions consist of a complex of rules that, because of their reliability, recognizability, and general applicability, serve to reduce uncertainty and promote coordination and cooperation among individuals. We further noted that such an arrangement fostered the formation of a spontaneous order within the interstices of the framework. More, we sought to understand the nature of change in such institutions and orders, with particular reference to Vanberg's reinterpretation of Hayekian cultural evolution. Accordingly, we highlighted the distinction between conditional and unconditional evolutionary arguments and its relevance to this aspect.

In this section as well as in the next two (D & E), our task is to illustrate these notions by considering in turn markets, science, and politics as operating within institutional constraints.

#### **1. Market Frameworks and the Process of Competition**

The market, as a nexus of exchange, is a system of social interaction within a specific institutional framework. Whether formal or informal, such a complex of rules define restrictions that constrain the behavior of market participants. In turn, enforcement of behavior considered acceptable may be effected, respectively, by private sanctions or through a government. Indeed, that part of government which acts as the enforcing agent

of society and which ensures that the terms of contractual agreements are honored and rights protected are refereed to, by Buchanan (1975, 95), as the *Protective State*.

In the insistence on recognizing that the market is a spontaneous order circumscribed by institutional bounds, we distinguish our approach from, on one hand, arguments of *market failure* and, on the other, of *laissez-faire*, as is often contrasted. Arguments for the former fail to account for the variability of institutional settings within which the market reposes. They thus overlook the insight that an adjustment in the rules framework may better deal with its perceived shortcomings than any substituted political mechanism. Arguments for the latter are also carried out in an institutional vacuum; in turn, this begs the question of what a "true unhampered market" is. In contrast to these approaches, let us examine more closely both the facets and setting of our conception of the market.

## **2. Competition as a Creative Process**

Market exchange is a social process with the commercial relations that make up economic life constituted on a vast network of cooperation. It is this insight of Adam Smith that has been reemphasized by Buchanan when he notes that "[t]he complex order of a market economy emerges from a large set of interlinked gamelike cooperative interactions between individual sellers and buyers, each of whom maximizes his or her utility in the localized setting of choice"(1989, 22). The characteristic behavioral element in a market order, and Smith's central endowment to economic thought is that in seeking

to satisfy others through producing something of marketable value, as an indirect means of producing value for oneself, participants can select from among a set of pre-existing goods but can also innovate, creating new goods of potential exchangeable value. Accordingly, as viewed from the Subjectivist perspective<sup>19</sup>, the agent's task rests in creative activity through the exercise of imagination (Littlechild, 1986, 29). Participants thus enter in competition to offer goods and services that may be of adaptational value to others while simultaneously trying to improve their own well-being.

Competition can thus be seen a trial-and-error process in which entrepreneurs try out new products, technologies, inputs, modes of production, and advertising, based on conjectures of current consumer preferences and hypotheses of how best to slake them. In turn, consumers, through their buying decisions provide the feed-back on what has been successful. Those entrepreneurs who better anticipated this demand could then be said to gain a competitive advantage *vis-à-vis* their rivals. The temporary monopolistic condition that this creates produces rents that are seen as the incentives necessary for the effort and risk-taking of the entrepreneur. The less successful competitors, by losing market share, are put under pressure to improve by innovating or imitating those who have been more successful. As Hayek points out in *Competition as a Discovery Process* (1978), competition is manifested in the rivalry among entrepreneurs who, through trial-and-error in seeking to earn profits, learn about consumer preferences while serving the needs of the same. This then is the core of Austrian Market Process Theory Thus, as in

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<sup>19</sup>See: Section I-B-4

any evolutionary process, there is, in a market within its given context, *variation*, in the constant emergence of innovation, *selection*, through the determination of consumers in choosing those items that they perceive to better enhance their fitness or well-being, and *duplication*, in the imitation of strategies, technologies, or products that have been perceived to be at the root of the competitor's success (Vanberg and Kerber, 1994, 198-201).

Since entrepreneurial creativity, in anticipation of consumer desires, drives competition, the outcome of the evolutionary market process is open rather than pre-defined. Each act of creativity leads to a new reality which in turn affects the course of subsequent innovative activity. In short, the market process is non-teleological. As such, the standard of competition cannot be tested against objective criteria but only in comparison to alternative process tracks.

In contrasting *order to equilibrium*, Hayek (1978) notes that whereas equilibrium presupposes that all the facts have been discovered and activity ceased, an order, as manifested in self-organizing systems such as the market, continuously uses the diverse and dispersed knowledge of all its participants. Competition as a process thrives on the use of information of time and place. The crucial feature of markets, then, is that it permits individuals to take advantage of the existing division of knowledge. Only in this way, notes Hayek in *The Use of Knowledge in Society* (1945), can resources known to members of a society be best used for the ends whose relative importance only these individuals know. Markets function best when they permit economic actors the

flexibility to affect deliberate adjustments in the face of change that takes advantage of their particularized knowledge. If competition is thus the "moving force of economic life," notes Hayek in *The Meaning of Competition*, then this raises the question of "what institutional arrangements are necessary in order that the unknown persons who have knowledge suited to a particular task are most likely to be attracted to that task" (1948, 93)?

### **3. Markets within Institutional Constraints**

The order of the market is a product of the human drive to adapt to present circumstances, given each his or her knowledge of time and place, within the confines of the given institutional setting. Adam Smith sought to harness the political order to establish the institutional settings which would condition commercial activity to prevent certain types of relations from corrupting social life. His *Wealth of Nations* is an attempt to set out a political institutional framework wherein the energies of economic individualism could contribute to the public interest (McNally, 1988, 178).

Smith held that man, in order to better his condition through specialization and trade with others, is in need of a coordinating mechanism. Individuals' activities, he noted, could only coordinate under a general framework of law that established the appropriate rules of the game, the "laws of justice" (Smith, 1982, 687). Such a legal framework, in enhancing the adaptation of market participants through competition, would limit competition by excluding the use of coercion, force, fraud and threats. In this

tradition, the economy is viewed as a competitive order, a structure defined by rules within which individuals engage in trade. By participation in the social institutions prescribed by such rules, individuals accept limits on the range of possible actions that may be contemplated. Such constraints, imposed on market participants, would render the behavior of each participant more predictable to the other and thus enhances the possibility of coordination leading to better adaptation through mutually beneficial exchange.

This notion of a market within rules constraints returns us to the contrast between *unconditional* and *conditional* evolutionary conjectures<sup>20</sup>. In particular, we had noted that unconditional conjectures do not specify the selective forces under which market processes unfold. In turn, this hobbles any effort to make predictions about the characteristics that surviving variants will exhibit. We had seen that conditional evolutionary claims, on the other hand, specify the competitive constraints within which one can conjecture as to what is likely to be successful; some forms of competition may be thought superior to others if that which is forecast to be generated by the process, as constrained, is considered more desirable.

This next prompts the question of what characteristics of the market competitive process are considered desirable: In response, we may make the normative determination

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<sup>20</sup> This contrast was previously explained in Section I-A-4

that in a market, the principle of *consumer sovereignty*<sup>21</sup> - responsiveness to the interests of consumers - is to guide the adoption of appropriate evolutionary constraints<sup>22</sup>. As such, note Vanberg and Kerber (1993), "[t]he claim that markets serve consumer interests is a conditional claim about the working of competition within appropriate rules" (209).

Whereas in a Hobbesian anarchy, competition is based on 'anything goes,' effective limits on competitive strategies make social order possible. Competition among individuals and groups as producers, to serve the interests of other individuals and groups as consumers within the nexus of the market, as constitutionally constrained, can serve to enhance the adaptive potential of all. Still, while it may be in the interest of all as consumers to live in a society where competition is conditioned on consumer sovereignty, it may be in the interest of particular individuals, as producers, to seek protection from the rigors of competition through discriminatory treatment. This can be fruitfully viewed in a Prisoner's Dilemma context where the seeking of such protection is the dominant choice, making all parties worse off than they would be in an open competitive environment. Given that it is in the interest of all as consumers to live in a competitive environment, such an order has to be additionally safeguarded against anti-competitive

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<sup>21</sup> The term *Consumer Sovereignty* was coined by Hurt (1934). Mises (1963) notes that it is consumers who determine, in their own changeable and unpredictable way, what has to be produced. Manufacturers and retailers would go out of business if they did not organize their factors and provide better and cheaper goods to satisfy their customers (269-273).

<sup>22</sup>The notion that success in the market-place should be channeled through the meeting the needs of consumers is central to the German Ordoliberal conception of competition. They distinguish between *Wettbewerbsordnung*, the rule of law or institutional framework set to maintain the 'proper' functioning of the competitive process, and *Leistungswettbewerb*, as the competitive order that unfolds within such rules. For more on the tradition of the Freiburg School in this regard, see : V. Vanberg (1991) "Review of Ordo, Vis. 40 and 41" *Constitutional Political Economy* Vol. 2, 397-402.

interests of each as producers. Thus constitutionally conditioned competition has to be complemented by constitutionally safeguarded competition (Vanberg, 1993,9-12).

#### *D. Order and Change in the Institutions of Organized Study*

For our next illustration, we revisit the questions of how an order is perceived and extended and of how the coordinative and cooperative functions of institutions are maintained, in this instance, through changes in the frameworks of scientific methodology. We begin by considering what the basis for scientific inquiry is: Hume's point, that knowledge is based on relating ideas and that ideas are based on classifying impressions, leads to the conclusion that ultimately it is custom and not reason that underlies scientific inquiry. In turn, this leads to the query of how such customs appear and of how they change. As we will see, Popper conjectured that scientists are distinguished by the critical attitude they hold and that this is reflective of certain adopted methodological practices. This raises the question of at what point current theory is to be replaced in the face of contrary evidence. Kuhn held that scientists work within a shared cultural community with work within such shared paradigms considered to be *normal science*. Revolutionary replacements of such paradigms were considered to take place in the face of repeated challenges. Finally, we note Lakatos' contribution that the advance of science consists of work within a set of rules as well as work to change the rules to more successfully tackle certain problems. This process is seen to be guided by a set of *hard-core* principles.

After briefly returning to the issue of economic methodology in light of such considerations, we turn to Loasby's interpretation of competition among scientific

frameworks. Loasby concludes that competition among a variety of interpretive frameworks is needed for intellectual and economic progress. In turn, we will point out the need to supplement this intuition by stressing the importance of guiding criteria in the propagation and selection from among alternative paradigms.

## 1. Conceptions of Methodological Practice

### a. Hume's Induction

That knowledge is based on empirical experience leads to fundamental doubts as to the foundations of knowledge. The human mind is a reasoning apparatus but requires sense data to reason with, according to Hume. Knowledge is thus based ultimately upon impressions. Such sense experience is the primary matter of all knowledge and ideas, concepts, and theories are but secondary or derivative.

Upon introspection on the human mind, Hume finds a collection and ordering of perceptions. Of these, he notes two kinds: *Impressions* which are derived from the primary senses and emotions, and *Ideas* which are based on later reflection upon these impressions. All our thoughts are held to be constructed from the basic impressions; "we can never *think* of anything which we have not seen [or in some way sensed] without us *or felt* in our minds."<sup>23</sup> We cannot have full knowledge with certainty regarding matters of fact and real existence; the only objects of knowledge are relations of ideas that we compare together. Given that knowledge is a mental linking of ideas which are

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<sup>22</sup>*Human Understanding*, 4.1. first two paragraphs

considered as such, holds Hume, we can have no insight into the world of realities but only into the world of ideas.

How then do we make the inference between cause and effect? It is seen to be based on experience with the assumption that the future will resemble the past. However, we cannot be certain that the same link will be established in the next similar case we identify. This leads to *the Problem of Induction*, the familiar illustration being that no matter how many swans one has seen, there is no justification in asserting that all swans are white as all swans, (past, present and future) have not been, and indeed can never be observed. The implication lent is that the scientific enterprise cannot possibly succeed (Gordon 1993,127).

To escape the skeptic's *cul-de-sac*, Hume reckons that causal inference is based on experience rather than reason. The mind gets into the habit of linking events that go together and that we can be set to *believe* that one precipitates the other. In sum, "all reasonings [about causation] are nothing but the effect of custom; and custom has no influence, but by enlivening the imagination, and giving us a strong conception of any object." Cause does not have anything to do with the objects themselves but is rather a mental artifice. The assertion of a causal link between two events rests upon a presumption of the existence in the real world of a relationship which our senses cannot perceive. When we observe two events together, and if they always occur in a particular order, we get into the habit of expecting one to follow the other.

As such, correct reasoning is not necessarily derived from observations of a great number of instances, but of the "more general and authentic operations of the understanding."<sup>24</sup> Causality is thus a psychological tendency to extrapolate experience to the future.<sup>25</sup> Hume concludes that it is custom and not reason that is a guide to life.

### **b. Popperian Falsification**

If reason cannot provide the basis of scientific inquiry, the issue turns on how one may demarcate a scientist from a non-scientist. Popper maintained that scientists are distinguished in that they accept methodological rules that fosters a "critical attitude."

In *The Logic of Scientific Inquiry* (1959), Popper repudiated the principle of verifiability, as developed by the Vienna Circle, and replaced it with the principle of falsifiability "as the universal *a priori* test of a genuinely scientific hypothesis"(Blaug 1976, 151). The Vienna Circle, a philosophical movement in the 1920's, and their followers held that although apodictic truths about the world may not be achievable for practical reasons, there nevertheless can be established ideal epistemic principles that must be followed by those who "search for the truth." In promulgating "logical positivism," they held the core view that science could furnish certain knowledge of how the world is, that concepts of science refer only to sensory observables , and that the language of science be strictly representational(Gordon, 1993,593).

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<sup>24</sup>*Treatise of Human Nature*, I.iii. 13

<sup>25</sup> In terms of experimental behaviorist psychology, we would be tempted to say that behavior is influenced by conditioning

Following in this tradition, Carl Hempel's deductive-nomological explanation consisted of statement of what is to be explained, deduced from a set of true statements and at least one law (Hausman,1994, 7). However, the "Problem of Induction" demonstrates that the "law" premise is not secure. Popper finding this obstacle insurmountable, contended that the laws of science must be treated as being composed of tentative hypotheses for it to be considered an empirical exercise: On one hand, the empirical truth of a conclusion can tell us nothing with certainty of the premises from which it is derived. On the other hand, the empirical falsity of a conclusion raises the concern that at least one of the founding premises is flawed. Thus, theories are but tentative conjectures which, while they cannot be verified, can be refuted; knowledge is built on the basis of ascertaining what is not true(Popper, 1963; Gordon 1993,600).

If science is a process of weeding out errant theories, then the possibility exists of throwing out useful theory on the basis of fallible evidence. While some have interpreted Popper as advocating the discarding of theory after a single failure to pass a statistical test (naïve falsification) Blaug holds that Popper was more concerned with the tendency of scientists to evade falsification by the construction of ad hoc amendments and auxiliary hypotheses(1976, 151). Deploring the tendency to immunize theories from criticism, Popper prescribes sound practices for science in advocating a willingness to abandon theories that have failed efforts to rescue them.

### c. Kuhn: Paradigm Shifts in Scientific Cultures

Kuhn's *Structures of Scientific Revolutions* (1962) points a shift from normative methodology to positive history; it deduces methodology from history rather than criticize history using methodology (*Ibid*,154). Kuhn viewed scientists working in a particular field as analogous to a social group, whose members, as in a cultural community, shared certain ideas and traditions and who sought validation in their theories upon the response of the established peer group of scientists. "Normal science" was thus consisted of problem solving within a given theoretical framework or paradigm.<sup>26</sup>

Initially, scientists are seen to work within the conception of the paradigm. However, as scientific data accumulates, anomalies - problems that resist solution within the boundaries of the given scientific tradition - erode the confidence of the scientific community in the given paradigm. Although these doubts are initially brushed aside, these begin to accumulate eventually rendering the paradigm untenable. "Revolutionary science" is then the overthrow of one paradigm by another as a consequence of repeated anomalies and refutations.

Kuhn's conception of how this shift takes place itself underwent change. In the first edition of *Structures*, Kuhn employed the term 'Paradigm' to stand for certain

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<sup>26</sup>. The term "paradigm" has come to be much berated: Blaug notes that "the term 'paradigm' ought to be banished from economic literature, unless surrounded by inverted commas," while Ruse opines that "the word 'paradigm' is about the most overused in the philosophic lexicon." Ruse identifies four senses of the term: the sociological connotation conveying the notion of a group with a shared outlook, an epistemological sense where what is considered interesting and what counts as a proper solution are bound up with the paradigm, an ontological aspect where what is depends on one's paradigm, as well as a psychological level (1993,124). Cognitive psychologists use the term to talk of the representations organisms have of themselves and their surroundings, an implicit mental model, or a world-view with its implied behaviors.

exemplary instances of past scientific achievement. Later, he construed it to mean "the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community"(1970, 173) These values are carried by a scattered and invisible college of practitioners who work under the paradigmatic framework. Kuhn came to admit that paradigm shifts do not occur abruptly and that there are, in any period in scientific development, a large number of overlapping and cross-fertilizing paradigms. Paradigms do not emerge as full-blown but rather emerge as dominant through a long process of intellectual competition.

#### **d. Lakatoš<sup>1</sup> Methodology of Scientific Research Programs (MSRP)**

Logical appraisal, the concern with what constitutes scientific progress, preoccupies Lakatoš. That this logic of appraisal is married to a historical theory purporting to describe scientific development marks his approach as distinct from that of Popper or Kuhn. In essence, Lakatoš (1970) holds that the philosophy of science should be concerned with modifying and comparing theories rather than assessing them. He sets conditions on what constitutes improvements as opposed to ad hoc appendages to theories: If the modification adds no new testable implications, it is considered unscientific. If the adjustment have testable though not yet confirmed implications, it is considered theoretically though not empirically progressive. If uniform theoretical progression and intermittent empirical progression are present, the addition is considered

progressive. Finally an improvement has to be consistent with the heuristic power of the central theoretical construct.

These progressive modifications are seen by Lakatoš to build up the prestige of a research program. Such a research program is characterized by a *hard core* and a *protective belt* - that is a core set of propositions and associated assumptions and conditions which can absorb the impact of contradictory evidence. In this way, theoretical hypotheses can be tested and abandoned if necessary without calling the hard core into doubt. Such a formulation also rescues the Popperian conception from charges of nai've falsification as under MSRP, the research program, as the primary unit of appraisal rather than a specific theory, is not abandoned with the discovery of specific empirical anomalies.

According to Lakatoš, the history of science demonstrates the progress of scientific knowledge when one research program is replaced by another. If progressive, the new program will not only account for all phenomena that the previous program covered but will also open up new and heretofore unrecognized areas of inquiries. In this way, "degenerating" programs give way to "progressive" ones.

## **2. Methodological Approaches in Economics**

Recent general methodology in economics has been preoccupied with epistemic appraisal - the rational acceptance or rejection of economic theories. Mäki refers to a *Popperian Dominance* in economics, a preoccupation with "certain questions and

categories, such as whether economic theories are falsifiable, whether a given proposition belongs to the irrefutable hard core or the revisable protective belt of a research program..."(1993,5). Empirical evidence, avowedly barren of inductive inference, plays a critical role in testing and in concepts of theoretical progress. But one cannot speak of rationality without reference to a methodology to which it is considered to conform. What then can be said of this rationality if this underlying, and almost always implicit, methodology is in itself not adequate?

One approach to considering the appropriateness of falsification is to question its adequacy as a general approach to scientific knowledge. First, according to the Duhem-Quine thesis, the failure of an empirical test to prove that A causes B may be due to the absence of other necessary factors. Second, as Hanson (1950) pointed out, what if the observations made are guided by an *a priori* theory? Facts become commingled with the theory to be tested. Finally, we consider the underdetermination thesis - that if more than one set of causal factors is sufficient to account for a phenomenon, then the empirical observations of it cannot tell which set is operative even if the observation is otherwise objective (Gordon, 1991,601).

Another approach is to survey criticisms derived from its use as economic methodology, such as which Hands has accomplished. With respect to the Duhem-Quine thesis, he notes that it is difficult to locate the problem in the auxiliary hypotheses as the complexity of human behavior requires numerous simplifying assumptions and initial conditions. More, the test of an economic theory may affect the initial conditions through

feedback effects. Next, Hands observes that qualitative comparative statics techniques make severe testing difficult and corroboration easy. Also, he finds that Popper failed to develop an adequate link between severe testing and truth-likeness and that this has led economists to difficulty in choosing between two falsified theories or between a falsified and a mildly corroborated theory. Finally, he concedes that the progress of theory in economics is different from Popperian progress; that economists are interested in finding new and elegant explanations to well known facts whereas Popper counts progress which is independently testable and which can predict new facts. Hands is led to admit that a strict adherence to falsificationist norms would "virtually *destroy all economic theory*" (1993,64; emphasis in original).

These arguments, while helpful, fail to get at the nub of the issue. Falsification would only seem to work if one has something to compare the theory's predictions against. In Physics, predictions can be made and compared with the stability provided by the natural universe.<sup>27</sup> In Economics, falsification cannot be a basis because the regularities studied by its practitioners are not founded on a stable foundation. As opposed to physical constants, economic activity is practiced under varying conventions that have gained legitimacy by their acceptance and which though are only relatively permanent. What is then to be falsified? Not the convention itself; and not the patterns of behavior engendered by such conventions for these are not rules but rather recognized regularities. The rules imputed from observance of patterns from a given period cannot

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<sup>27</sup> Physical astronomers have postulated that the known laws of physics do not apply in Black Holes.

be considered falsified when the pattern observed at a later point reflects changes in the underlying convention. They can only be considered to be of limited value.

In response to the weakness of the Popperian approach in its application to economics for reasons such as those listed by Hands, economists have turned to Lakatos' methodology because it allows for conservatism on key propositions without giving ground on the notion that empirical evidence is vital in the development of theory formation. As Hands notes, "[a] philosophical programme such as Popperian falsification which requires practitioners to be willing to give up almost any part of their research program at any time will not provide an adequate guide for economists as Lakatos' methodology which allows for pervasive hard cores"(1993,68). Even more, Lakatos's emphasis on progress as corroboration over falsification is more suited to the way most economists interpret their craft.

Lakatos' appeal also derives from his approach to how research programs shift. While Popper largely ignores the framework within which scientific activity takes place, it is precisely this framework and the problems of changing it that preoccupy Kuhn and Lakatos. In its original conception, Kuhn's paradigm shift occurred in discrete jumps, like a mass religious conversion where scientists are "born again" in the way they now look at the world(Gordon 1991,602). This conception brought about a storm of protest from philosophers who contended that this would deprive scientists of an adherence to an empirically controlled method of inquiry. Subsequently, Kuhn revised his position to state that paradigms are not totally divorced from each other and that epistemic criteria of

theory choice, such as simplicity and verisimilitude, come into play in persuading scientists to shift from one paradigm to another. With this compromise, however, Kuhn emasculates the notion of a paradigm. Lakatoš<sup>1</sup> gradual degeneration of research programs giving way to more progressive ones seems to conform more to the experience of economists.

Both Kuhn and Lakatoš seem to miss the central issue in the transformation of scientific paradigms. Lakatoš's protective belts look at history to impose patterns on it that regard degeneration and progression to take place about fixed cores. While Kuhn introduces the intriguing concept of a paradigm, he too conceives it as being fixed with the shift in paradigms akin to a philosophical group selection. The development of science can better be understood in terms of a mechanism analogous to the *population thinking* interpretation of Darwinian Natural Selection. Paradigms are not fixed entities to which people can subscribe but are rather properly placed in the mind of the individual. Doubts among individual scientists as to the validity of the popular or governing paradigm may lead individual members to search for alternate models. These shifts may in time be identified as constituting a new theoretical framework. Such an approach vests importance in individual ingenuity and creativity while revealing the tension between coordination in scientific investigation and the usefulness of the framework within which this coordination takes place.

We have belabored over these methodological issues because an appreciation of this tension is of relevance to a proper understanding of economic adaptation and institutions.

Economic coordination within and adaptation to an evolving constitutional setting that is led by the creativity of its individual members parallels that of scientific activity. Even Evolutionary Economics, incorporating biological metaphors and recognized as an alternate basis for understanding the dynamic nature of economic activity, is incomplete in, among other respects, that it largely fails to incorporate the role constraints upon individual ingenuity and trial.

### **3. Man as Scientist and Changes in Scientific Paradigms**

The relationship between individual psychology and the rule auspices of cooperative behavior are a recurrent theme in the writings of Loasby. We inspect the connections he makes between the two with an eye to illustrating our earlier points with respect to scientific enterprise while, at the same time, taking note of Loasby's limitations.

Loasby is much taken with the proposition of the psychologist, George Kelly, that we should consider man as a scientist: Individuals are seen to make sense of their world by imposing some interpretive framework on it; "scientific knowledge is not discovered, but created"(1986,45). Actions are then to be explained in terms of these perceptions. Accordingly, model based perception, though inevitably partial, must demonstrate its serviceability by accounting for new events. Thus, even partly inconsistent theories may survive and even prove valuable if they serve as a basis prediction and control. Growth of knowledge then involves the modification of theory to expand such explanations based

on what needs to be controlled (Ibid., 46). Personality breakdown is seen to occur when events change beyond the individual's ability to adjust his theoretical structure, or when the needed adjustment implies a large-scale reordering of the architecture of thought (Ibid, 47).

Loasby sees a similarity between the Kellian notion of an imposed interpretive framework and the views expressed by Adam Smith and George Shackle (1989, 1-5). Smith, in his *History of Astronomy*, is seen to note that the Newtonian system, however brilliant, is a product of Newton's imagination and is not to be regarded as a description of reality (Smith 1980, 105). Shackle is similarly seen to deny the notion that theory describes reality: "The question for the scientist is what thought scheme will best provide him with a sense of that order and coherence, a sense of some permanence, repetitiveness and universality in the structure and texture of the scheme of things" (Shackle, 1967, 286).

If, according to Kelly's proposition, man is a scientist, then, by extension, an organization can be thought of as a "visible college" of scientists. Within such a group, there are requirements of compatibility on what constitutes a problem and conventions on how the solution is to be derived; "Such conventions do not embody scientific truth, but provide the institutional framework within which scientific truth may be effectively sought" (Loasby 1993, 206). Individuals collaborating in scientific enterprise need to share at least some aspects of an interpretive mental framework for their efforts to remain compatible. However, given that scientific activity can generate change in the

interpretive framework or paradigm, the question that then arises in our minds is one of how such compatibility is to be maintained.

Loasby examines the conceptions of shifts within and among frameworks as put forth by Popper, Kuhn and Lakatoš. It may be recollected that Popper considered the logic of science to be one of refutation. That is, the validity of a theory is corroborated by the failure of attempts to refute it. More, Popper emphasized that no test is fully decisive as it is possible to contend that what has been refuted is one of the many hypotheses that have been accepted in order to arrive at the particular conjecture under scrutiny. Popper thereby opened the question of at what point a theory should be abandoned in the face of contrary evidence. Thus Popper seemed to distinguish between change within a particular framework and changes among frameworks. Although change within a framework is easier, he noted, "if we try, we can break out of our framework at any time. Admittedly, we shall find ourselves again in a framework, but it will be a better and roomier one; and we can at any moment break out of it again"(1970, 56).

This process of adjustment along two tracks can be considered, along with Kuhn, as "normal science" and "revolutionary science." The basic features of science are accepted without test by all subscribing scientists. Such a paradigm is seen to allow problem solving activity within bounds. However, as the limitations of these bounds become manifest in a rising proportion of explanatory failures, a crisis mounts resulting in the acceptance of a new set of conjectures within which to pursue further work. In

Kuhn's conception, there is no algorithm for choosing among paradigms; logic only rules within paradigms, not among them.

Similarly, Lakatoš also avers that the advance of science consists of work within an agreed set of rules as well as work to change the rules in order to more successfully tackle certain problems (1989, 21). Lakatoš dealt with the criterion of falsifiability by considering the scientific research program to consist of a hard core of basic assumptions and a protective belt of associated theoretical hypotheses. Progress in science occurs when one research program, that accounts for phenomena previously explained as well as which opens new veins of inquiry, replaces another. Implicitly, therefore, any choice in research programs thus must include some assessment of what is worthy of examination.

In reviewing such considerations, Loasby concludes that competition among a variety of interpretive frameworks is needed for intellectual and economic progress (1986, 52; 1983, 119). In the case of industry, he points out that the existence of a number of firms, with different constructs and organizational agreements, in competition will lead to greater adaptation within an industry than by the setting of an industry standard by which all firms have to conform. While we are not in disagreement with Loasby, it must nevertheless be pointed out that he leaves out important considerations of the relevant terms and structure of competition. The issue then is of how shifts between paradigms is to be modulated. To consider this aspect more fully, let us go back and evaluate the points that were drawn by Loasby from Popper, Kuhn and Lakatos.

Loasby rightly points out that while Popper has made the distinction between the extension of knowledge within a framework and through the replacement of frameworks, he has not dealt with how this transformation is to be affected (1986, 43). It is with this problem in mind then, that Loasby looks to Kuhn and Lakatoš. However, Kuhn is at best vague with respect to the criteria by which competing paradigms are evaluated<sup>28</sup>. There can be said to exist different kinds of competition in science; paradigm shifts, whether revolutionary or gradual depend on how competition in scientific enterprise is constructed. For example, the nature of the change that Copernicus brought about in astronomy was revolutionary due to the harsh terms of competition imposed by the Church in its affection for an earth-centered universe.

Lakatoš' distinction between hard-core and protective belt can be considered to be consistent with an interpretation of competition among the derived hypotheses of the protective belt. However, it does not go further in considering competitive relations, and hence the pace of transformation, among the relative hard-core propositions, as governed by, for the lack of more elegant terminology, a relatively harder hard-core. Thus, while Loasby rightly concludes as to the importance of variety and competition in drawing from the above sources, he neglects to consider both the immediate terms of competition as well as how it is structured.

What are the terms and structure of competition in science then? According to the Duhem-Quine hypothesis, it is logically impossible to test a single hypothesis as any test

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<sup>28</sup>Paradigm shifts seems to echo group selection in scientific communities. If so, the notion of paradigm shift would appear to suffer from the same doubts that group selection raises.

reflects on a set of hypotheses. This seems to leave open the question of what exactly is refuted when faced with the failure of a test. To pursue this, we may recall that in our review of thought institutions we considered there exist relative levels of *a priori* predispositions which condition the competition among subsidiary levels of conjectural rules. Accordingly, we noted, the organism's mental apparatus can be thought to entertain competition among rival models conditioned by more fundamental levels of rules while at the same time holding these governing predispositions subject to evaluation by the failure or success of the individual's ability to adapt using the knowledge generated within such frameworks.

This suggests that if science were similarly structured, the failure of a particular hypothesis might stimulate competition among other hypotheses framed within the same governing rules. If this failed some intersubjective standard, competition could be initiated among rules at this level, and so on. The smoothness with which transformation in scientific practice may be made would then depend on an understanding among a college of scientists, based on variable degrees of consensus on the structure and terms of competition arrayed within it, as to the constitutional framework or methodology within which they seek to usher their discipline.

### *E. Experimentation, Adaptation and Constitutional Design*

An extension of adaptive change within constraints to the context of social constitutional frameworks provides yet another opportunity to crystallize the Constitutional vision with respect to institutional order and change.

We have previously noted that within the *personal constitution*, competition among mental representations is conditioned by presiding rule levels and, more, that such rule levels may include those that reflect socially imposed or agreed to rules. We have also held that a subjectively evaluated dissatisfaction with respect to the adaptive potential of the alternatives generated within a particular framework may lead to the evaluation of that framework itself. In this section, we put together these two notions to consider the means by which individuals, disaffected by attempts to personally adapt under the aegis of social institutions, may reevaluate such frameworks. We consider therefore how a more explicit understanding of how the structure and mechanisms for competitive evaluation of rules within and among social constitutions may lead to greater facility in personal *adaptation*.

## 1. Levels of consensus and rule experimentation

The acceptance of each individual in a group of a set of rules to which all members are subject underlies the legitimacy of social institutions. However, experimentation among rules with selection proceeding on the basis of full unanimity, particularly in large groups, may be cumbersome at best. Strict unanimity criteria in the adoption of such rule change may lead to a *hold-out problem* where each interest is motivated to withhold consent to the mooted agreement until his or her best position is realized. Such action can lead to paralysis. As well, though not unheard of, individuals are generally inhibited in pressing for change in social rules if such an effort would require personal sacrifices. Public-spiritedness in this regard would, in general, therefore not be expected to be forthcoming. Such considerations can have a paralyzing effect on the adaptability and, hence, relevance of rules for the constituent members. Such issues raise the consideration of how citizens may more readily and fully participate in considering constitutional changes. With this in mind, we examine and evaluate below various contexts within which social rules can be changed

In considering changes in social rules, we distinguish, again, between *unconditional* and *conditional* evolutionary claims. To recall, for unconditional claims, no substantive conclusions can be drawn as to the desirability of what survives. On the other hand, conditional claims specify the commitments and constraints from which the alternatives are to be selected. These may be based on conjectures by each as to what is likely to be of relevance. Social constitutions reflect such conditional conjectures in

committing and constraining subsidiary rules in how they may be proposed and adopted. So established and thus characterized, constitutional level rules may set out the criteria by which sub-constitutional decisions may be made as well as establish the conditions under which competition among sub-constitutional rules may be played.

On the constitutional level, individuals may hold theories about the working properties of alternative rules as well as bear interests based on subjective evaluations of their expected outcomes (Buchanan and Vanberg, 1989, 52). Given this, there exists in constitutional negotiation a motivation to introduce rules that are biased towards such interests (*Ibid*, 53). However if individuals realize that pursuing such interests may inhibit the realization of the gains of constitutional reform, they may seek ways to escape it. A smaller likelihood of disagreement and a motivation to be fair among rule-makers may arise when considering constitutional rules due to the *veil of uncertainty*, that is, as the rule-makers may not be able to anticipate accurately the particular ways in which they may be confronted by their own rules in the future, it is considered that there will exist an effort on their part to be more even-handed(*Ibid*, 54). The more general rules are and the longer period over which they apply, the less certain individuals will be about how proposed rules will affect them. As such, rules at the constitutional level reflect in general principles more abstract than those at the sub-constitutional level (*Ibid*, 55).

Subsidiary social rules, like those generated by a legislature, derive their legitimacy through being generated through competition conditioned by constitutional rules and selected accordingly via majority- based decision-making processes. As such,

greater opportunities are provided for such rules to be provisionally tried and evaluated. As Buchanan notes, majority rule "provides the opportunity for any social decision to be altered or reversed at any time by a new and temporary majority grouping. In this way, majority decision-making itself becomes a means through which the whole group ultimately gains consensus, that is, makes a genuine social choice. It serves to insure that competing alternatives may be experimentally and provisionally adopted, tested, and replaced by new compromise alternatives approved by a majority group of ever-changing compositional 960, 83).

## **2. Constitutional Experimentation in Series**

While the mode of competition and means of selection among levels of sub-constitutional rules can be understood to be established by constitutional rules, the question arises of the circumstances under which changes in constitutional level rules can themselves be affected. To be considered legitimate, change at the constitutional level requires, as we have noted above, an acceptance of the proposed changes by each participant into his or her personal constitution; a profound consensus. We now examine several ways in which such a consensus may be broached.

### **a Constitutional renegotiation under crisis**

Large-scale crises such as war and political revolutions, geological events such as earthquakes and floods, or severe economic conditions such as depressions, each of

which touch the lives of large numbers of people, often act to form a widespread consensus for some manner of constitutional change. As such these events often provide the focus needed for an engaged public discussion on constitutional alternatives. As Madison noted in the Federalist 49 with respect to the American revolutionary experience:

We are to recollect that all existing constitutions were formed in the midst of danger which repressed the passions most unfriendly to order and concord; of an enthusiastic confidence of people in their patriotic leaders, which stifled ordinary diversity of opinions on great national questions; of a universal ardor for new and opposite forms produced by universal resentment and indignation against the ancient government; and whilst no spirit of party connected to the changes to be made or abuses to be reformed, could mingle its leaven in the operation.

However, the entertainment of alternatives in constitutional change under crisis may not be subject to rationality as set out by conditioning criteria. To take examples from the same period in history, change immediately following political revolutions led alternatively to the formation of an American constitutional order considered stable relative to the conditions of the Reign of Terror in France. Within the experience of this century, historians point to the dire economic straits of the citizens of the Weimar Republic as prelude to the emergence of Hitler and the Third Reich in Germany.

#### **b. Article V - Type procedures**

The sub-heading refers to the amendment procedure of the type outlined in the US Constitution. Article V requires a succession of approvals by significant majorities in the

federal as well as state legislatures, with a significant number of the state legislatures approving. By creating such onerous and stringent approval formalities, the Constitution in effect requires a profound consensus.

By making the Constitution difficult to change, Madison and the other Constitutional framers hoped to avoid wasteful struggles over self-interested rule-making, and to discourage frivolous attempts to modify the Constitution. By placing the amendment procedures beyond ordinary reach, he hoped to force a process of bargaining, creating opportunities for individuals to debate at length and in sobriety their interests and theories in the new proposals.<sup>29</sup>

However the *publicness* aspect of proposed constitutional modifications may bias the Constitution to become more permanent than perhaps envisioned by Madison and others. As Buchanan asks, "who are to take upon themselves the personal burden of designing provisional proposals for basic changes in the rules when the promised benefits accrue *publicly*, that is with no differentially identifiable residual claims to the promised "social" profits" (1985, 144)?

### **c. Constitutional Revision through Dialogue**

In examining the popular foundations of American constitutionalism, Bruce Ackerman in *We the People* suggests that the engagement of the populace in the process of higher law-making depends on a dialogue between the leaders and masses. He

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<sup>29</sup>James Madison: *The Federalist Papers*, Vol. 13, p. 22. Ed. Clinton Rossiter. New York: New American Library, 1961.

suggests that constitutional institutions be designed so as to create incentives for spirited deliberation, to recognize rare instances of popular mobilized decision-making, and to preserve the judgments of such movements from erosion by statutory law-making.

In order for a political movement to gain consideration in constitutional politics, Ackerman requires partisans to convince an "extraordinary" number of citizens to consider their initiative seriously and to allow for an opportunity for an opposition to form in order to debate to issue fairly. Only then, he avers, will the political movement gain the enhanced legitimacy required for constitutional consideration (1991, 6). Such transformative appeals, Ackerman acknowledges, may require generations of preparatory work in order to force the issue into the spotlight. Yet, even after this stage, the transformative process may fail.

If a constitutional amendment proposal can navigate past the "signaling phase" of accumulating broad public support, the "proposal stage" of debate and rhetoric, the "mobilized popular deliberative stage" of broad participation and deliberation through referenda, it may finally reach legal codification (*Ibid.*, 266). Ackerman however does not invoke the Article V provisions of the US Constitution; rather he entrusts the courts with transforming the successes of the above processes into doctrinal principles capable of controlling politics (*Ibid.*, 290).

In assessing Ackerman's thesis, we come up again against the *publicness* issue. More, given that agendas are considered to be pursued through time-frames described as generational, their probability of passage is made more dubious. Also, in invoking a

dialectic or discourse approach, the implicit premise undertaken is that agreed on principles gain legitimacy from the fact that they are seen to embody some superior quality. The debate that is to occur is one based on the relative merits of competing theories upon which the interests of the individuals are transformed as opposed to the contractarian notion where individual interests are the inputs and a mutually acceptable compromise is the result of a bargaining process (Buchanan and Vanberg 1989, 56). By institutionalizing venues for dialogue through referenda, Ackerman equates a search for truth with political discourse - an elitist and paternalistic notion.<sup>30</sup> Finally, the proposal to bypass constitutional provisions for change and to utilize the courts to insert implicit alterations into the constitution creates additions that are the product of a dialogue process to a document that is a product of a contractual process. Within such a scheme, the legitimacy of the constitution itself is eroded.

#### **d. Jeffersonian overhaul**

While Jefferson did not believe the Constitution to be a perpetual and unalterable document, he did place faith in citizens' ability to secure basic individual rights and form of democratic government within its framework. While on one hand he endorsed "limited constitutions to bind down those whom we are obliged to trust with power,"<sup>31</sup> on

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<sup>30</sup>See: Buchanan, J.M. "Foundations for Normative Individualism" in *The Economics and the Ethics of Constitutional Order*. Ann Arbor: University of Michigan Press, 1991.

<sup>31</sup> Thomas Jefferson: Letter of September 7, 1803; *Writings*, ed. Merrill Preston. New York: Library of America, 1984, p. 251.

the other hand, he attacked the idea of constitutional pre-commitment, believing that one generation of men had no right to bind the next. Jefferson held this view in recognition that laws and institutions should adapt with progress and change. He noted that "[a]s man becomes more developed, more enlightened, as new discoveries are made, new truths discovered, and manners and opinion change with the change in circumstances, institutions must advance also, and keep pace with the times."<sup>32</sup>

By studying actuarial tables, Jefferson concluded that a generational turnover occurs every nineteen years or so. It seemed to him that at such intervals, each generation, independent of the preceding one, had the right to choose the form of government most adapted to pursuing its own happiness. Considering the mere opportunity of change through constitutional procedures, as promulgated by Madison, as insufficient to remove the burden of posterity, Jefferson sought to hold periodic and obligatory constitutional conventions every twenty to thirty years to determine the form of government. At such junctures, all laws and institutional arrangements would lapse and new ones would be considered and adopted.<sup>33</sup> By requiring these meetings, Jefferson was in effect proposing a meta-constitutional precommitment to certain procedures of constitutional renewal.

Madison disagreed with Jefferson, holding that constitutional decision-making ought to be kept open only for special occasions when certain psychological

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<sup>2</sup>Letter of July 12, 1816, *Writings*, p. 1401  
*Ibid*, p. 961

preconditions relating to mutual trust and cooperation would exist. Moreover, he felt, frequent constitutional conventions would create a legal vacuum where decisions would not be based on their merits, propelled by a unity of purpose.<sup>34</sup> Finally, Madison thought that Jefferson's call for periodic conventions would expose the constitution to too much self-interested behavior, thus diminishing the document's legitimacy and significance. In short, Madison saw no need to schedule "magic moments" in which to reaffirm the constitution. Rather, he viewed the existing framework as valid if it merely provided opportunities for action to revise the constitution without fear of punishment.<sup>35</sup>

It would appear that while Jefferson was concerned with legitimacy through constitutional awareness in the eyes of those who order their lives within its framework, Madison was worried that reinventing the constitution periodically would lead to volatility that would undermine the institutions that such a framework may nurture. A compromise that accommodates Jefferson's idea while taking into account Madison's concerns might involve the innovation of special opportunities to consider constitutional adaptations while maintaining the conditions of profound consensus for the adoption of amendments. Creation of such focal points would create opportunities for greater awareness and adaptation: It would, within each person's lifetime, create discrete

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<sup>34</sup>Madison: Federalist 49

<sup>35</sup> Criticism of the Jeffersonian formula can also be found in Hume's *On the Original Contract*. Here, Hume considers as unrealistic the notion of discrete generational prominence:

... but as human society is in perpetual flux, one man every hour going out, another coming into it, it is necessary, in order to preserve the stability in government that new broods should

opportunities to look beyond one's everyday sub-constitutional operations and more explicitly evaluate one's interests and theories in alternative constitutional arrangements. It would also lower the threshold of inertia associated with *the publicness* issue as public concentration on the issue of constitutional renewal would provide serious proposals of reform a better chance of consideration and approval. Finally, by manufacturing such events rather than let crises precipitate them, reform may proceed more cautiously, conditioned by and more mindful of meta-constitutional considerations protective of such rights and procedures as are considered to enhance personal adaptability.

### **3. Constitutional Experimentation in Parallel**

We reviewed above alternate means of constitutional experimentation in series; in other words, modifications in the structure of the constitutional framework were tried out one at a time and replaced or modified as seen to be required. In a revolutionary situation, there may be considered to be an exit *en masse* by the group from the aegis of the previous constitutional structure and into a new replacement. In contrast, dialogue or amendment processes rely on expression by individuals to gain support for serial change within the processes outlined within the current system. As such, this invokes the distinction, as crystallized by Hirschman (1970), between *exit* and *voice*.

Another way in which constitutional experimentation may be carried out is in parallel. For instance, alternative constitutional structures may be in effect in different

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conform themselves to established constitutions, and nearly follow the path which their fathers, treading in the footsteps of theirs, had marked out for them (1987, 476).

jurisdictions with choice among them expressed through the mobility of people and resources. In turn, this introduces the scope to develop constitutional frameworks that condition the competition among jurisdictions for citizens and taxable resources. Conversely, we can also imagine an appropriately conditioned competition among multiple sources of authority within a single boundary. Thus, in these instances, the exit option is emphasized over that of voice.

In assessing the exit option under parallel constitutional competition, we begin by considering the similarities of choice among alternatives to that which may be considered to exist in competitive market situations.

#### **a. Citizen Sovereignty**

We have previously, in the context of discussing markets within institutional constraints (Section IV-B-1-b), noted the concept of *consumer sovereignty*. Inducing producers to be responsive to consumer interests by making this the sole channel through which success is to be gained is considered to underlie a desirable competitive market order. The institutional counterpart when considering competitive rule orders rests in the notion of *citizens sovereignty* (Vanberg and Kerber 1994, 211). The term encompasses the notion that political entrepreneurs are induced to be responsive to citizen interests through competition where residents select among the packages of institutional features proffered by alternative jurisdictions. In pondering how a competitive political order might be structured such that political entrepreneurs would be interested in attracting such

potential tax-payers and taxable resources, the above authors propose inter-jurisdictional competition conditioned so as to render such public officials more sensitive to citizen preferences.<sup>36</sup>

### **b. Prospects for inter-jurisdictional competition**

Vanberg (1993 c) and Vanberg and Kerber (1994) consider the migration of individuals and resources from one jurisdiction to another as an expression of individuals' selection among the combination of institutional features found in each. Still, given that considerable costs are entailed in moving among jurisdictions, questions relating to the prospects for inter-jurisdictional competition and hence institutional responsiveness arise. In response, the authors note that marginal residents, those with low exit costs, can play the same role that marginal consumers play in influencing market competition. More, financial resources and other forms of capital are more mobile and can transfer from locale to locale with relative ease (1994b, 205).

Migration costs are as well functions of constitutional design and constraint. For example, given that a decentralized federal system of government divides its territory into several competing jurisdictions, the increased choice generated within such a constitutional arrangement can in turn reflect on the responsiveness of governments

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<sup>36</sup>Although not fully drawn out in their analysis, the implicit realization is that just as producer success is to be pursued through the narrow channel of serving consumer interests through product innovation in the marketplace, so political entrepreneurs, properly constrained, would seek success in attempting to innovate with respect to the institutional features of their particular jurisdiction to lure citizens and resources. It should perhaps be made more pellucid that some connection exists between political success and the attraction of such taxable resources.

(Wiseman 1990, 122; Vanberg 1993c, 15). Also, to ensure that costs of mobility are not artificially raised through the imposition of exit visa fees and other coercive means, constraints that condition constitutional competition have to be considered. Jurisdictions may compete by making their institutions attractive to citizens and investors or, alternatively, by coercing the way in which selection is made. The terms of competition depend on the relevant constraints (Vanberg and Kerber 1994, 211).

What these competitive constraints are is the concern of what the German Ordoliberals call *Ordnungspolitik*; that is, economic policy has to focus on the continuous monitoring, enforcing, and improving of the rule framework. The competitive order (*Leistungswettbewerb*) to be encouraged may be secured alternatively through the breaking-up of large jurisdictions into smaller ones, through rules that secure the mobility of persons and resources and, through limiting cartel-like *ex ante* coordination among governments. As well, entertaining the possibility of collective exit or entry of jurisdictions from the purview of one higher legal authority to another can act to make rule-makers at that level of institution more responsive. Moreover, this threat of secession on the part of component jurisdictions can act to constrain and counter-balance the powers of the federal government in its regulation of competition among its constituent localities (Vanberg, 1993c, 15). An example of such provisions for secession can be found in the constitution of the Swiss Confederation<sup>37</sup>.

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<sup>37</sup> Here, we focus on secession within subordinate political units. The Swiss Constitution allows local but not national secession. The issue of secession at the national level is discussed by Allen Buchanan (1991).

Creating constitutional constraints and inducements for political entrepreneurs to become more sensitive to citizen preferences through inter-jurisdictional competition of institutional order also fosters the growth of knowledge in that through experimentation and exploration of alternative constitutional arrangements and political regimes, solutions to individuals' adaptive needs may be generated. Just as appropriately constructed and constrained market competition generates knowledge through encouraging innovation and selection, such "[i]nter-governmental competition provides, in the political realm, a similar opportunity for parallel experimenting and diversity, and allows citizens to, more or less directly, compare the working properties of alternate institutional-constitutional arrangements"*Ibid.*, 18).

### **c. Prospects for competition among concurrent jurisdictions**

Thus far, we have considered jurisdictions as characterized by a marked geographic area maintaining a single rule-making authority and seen how individuals may more freely select among the institutions fostered within each. The notion of concurrent jurisdictions contemplates the existence of polycentric sources of authority competing for turf within the same boundaries. In such a situation, these sources of authority may be thought to compete for power and the allegiance of the citizenry. In this way, one might initiate a process that is responsive to the interests of citizens. However, yet again, this competition has to be appropriately conditioned if it is to work in the interests of *citizens sovereignty*.

An interesting case study of such competition involving secular and ecclesiastical authorities is offered by Harold Berman (1983) in his examination of the relationship between Henry II of England and the Archbishop of Canterbury, Thomas Becket. Berman notes that the concept of dual authority led to an uncomfortable situation between the two men. On one hand, the king, as a Christian, was a subject of the pope. The church, though not possessing armies of its own, could impose spiritual sanctions including excommunication and interdict. On the other hand, the church, which itself was the author of the concept of dual authority, was dependent on the king's armies to enforce its wishes against recalcitrants. As well, bishops and other church officials relied on secular support in order to gain office (262).

The boundary between the royal and papal jurisdictions was the source of the conflict between Henry and Becket. When Henry issued the *Constitutions of Clarendon* in 1164, reasserting royal supremacy over the church in matters of legal jurisdiction, Becket denounced it as an usurpation. For example, the royal courts would now decide in land disputes where the question to be settled was whether a parcel belonged to the church or not. It also set out that a felonious monk, found guilty in an ecclesiastical court should be brought to the king's court to be sentenced. The political struggle that ensued came to an end in 1170 when four of the king's men, in response to overhearing Henry utter "Will no one rid me of this pestilential priest," murdered the archbishop in Canterbury Cathedral. The popular revulsion at the assassination set back Henry's

initiative as he was forced to renounce those portions of the *Constitutions* that were considered offensive before the papal legate (256).

While both the church and the crown accepted ecclesiastical jurisdiction over spiritual cases and royal jurisdiction over secular cases, there was no agreement on the boundaries between them as well as no process by which the dispute could be settled. In other words, the competition between the two was not (and perhaps could not be) conditioned on any principle. Still, as Berman points out, "plural jurisdictions and plural legal systems became the hallmark of Western legality"(268). This legacy can be evinced in the American Constitution which, in its use of *checks and balances*, sets out the competitors and the terms of resolution among the judicial, legislative and executive branches of government, as well as in its legal system which retains a certain jurisdictional competition between federal and state courts and laws.

#### **4. The Upshot**

Acceptance of the notions of conditional evolutionary claims and citizen sovereignty prompt the consideration of constitutional venues that pose experimentation in parallel as offering citizens more opportunities to proffer, adopt, or opt out of alternatives among social rules. The terms that condition such parallel competition can be considered as subject to competition among alternative rules that are in turn governed by still more fundamental levels of competitive constraints.

## IV. Order and Change in Neoclassical Economics

What are the constitutional constraints of neoclassical theory in economics? Is its neglect in providing an adequate theory of institutions reflective of the systemic and incurable limits of the paradigm? These issues are examined below with particular reference to the style of neoclassicism associated with the research program at the University of Chicago. Such considerations lead to the appreciation that the difficulties with the neoclassical account have to do with its assumptions, particularly those implied about the nature of human knowledge and behavior.

We begin our brief tour of neoclassical economics by considering its roots in late nineteenth century physics. Physicists at that time held that the equations of the Newtonian model fully explained the physical universe and that their remaining task lay largely in filling in more decimal places in its constants. The underlying postulation was of an unchanging universe whose structure could be steadily revealed through the study and accumulation of more data (Wehr, Richards and Adair 1984, 3). In copying its methodology from physics, neoclassicism also adopted the posture that there exists some social reality, an order whose form would become apparent through study. Neoclassicism has hence come to be preoccupied with exposing the laws and axioms that are considered to regulate economic activity.

As a representation of this approach, we examine the axiomatic foundations of Rational Choice Theory. In doing so, we note the Chicago emphasis on the distinction between positive and normative economics and on the importance of prediction over the realism of assumptions. We also note that these axioms, considered insufficient to generate the necessary relations on their own have been supplemented by auxiliary assumptions. It has been alleged, however, that the use of auxiliary assumptions to save the framework from contradictory evidence has revealed the theoretical framework as weak.<sup>38</sup> Ironically, though, it is this preoccupation with paradigm preservation that has provided the disciplinary unity and has rendered the distinctive flavor associated with Chicago style economics. Also, given that neoclassical preoccupation with the relations underlying some fundamental underlying social order, changes to that order are considered to arrive as exogenous shocks.

Indeed it is in the lack of appreciation for the issues of human knowledge and behavior, and the understanding of social institutions that they found, that the fundamental weakness of neoclassicism lies. The limitations of the neoclassical framework in accounting for institutions prompts a more serious consideration of the proffered alternate theory of social institutions. Such an alternative, we have seen, is part of a broader approach; one which, by incorporating a theory of human knowledge and behavior within an evolutionary perspective, does not run into the difficulties for which the neoclassical position has been criticized.

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<sup>38</sup> This compares with the use of epicycles in Ptolemaic astronomy to explain the movements of planets and preserve the model of an earth centered universe against contradictory evidence made available by the

## *A. Neoclassical Rational Choice Theory*

### **1. Roots of the Neoclassical Methodology**

The loss of appeal among many economists for neoclassical methodology rests on the contention that while its approach is suited to the study of natural sciences, economics is not physics and that the methodology of natural science is not applicable to economics. Mirowski (1989) underlines this point by arguing that neoclassical economics has borrowed shamelessly and incautiously from physics; he notes that the resemblance between neoclassical economics and physics are uncanny, "and one of the reasons they are uncanny is because the progenitors of neoclassical economic theory boldly copied the reigning physical theories in the 1870s. The further one digs, the greater the realization that those neoclassicists did not imitate physics in a desultory or superficial manner; no, they copied their models mostly term for term and symbol for symbol, and said so"(3).

Mirowski then traces the transfer from physics to economics of the energy metaphor: "Although it was ultimately called "energy" in physics and "utility" in economics, it was fundamentally the same metaphor<sup>39</sup>, performing many of the same explanatory functions

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invention of the telescope.

<sup>39</sup> Cohen (1993) distinguishes analogy and homology from metaphor. The term 'analogy' is correctly used to refer to similarities that depend primarily on relations of functions while 'homology' refers to a similarity that depends primarily on structure. A metaphor is a fictive comparison or contrast of some property or function to an object or concept to which it does not properly apply. "Since a metaphor is a means of

in the respective contexts, evoking many of the same images and emotional responses, not to mention many of the same mathematical formalisms "(4). In noting that neoclassical economics follows physics slavishly with respect to its mathematical superstructure, Mirowski concludes that economists get bogged down on problems unwittingly imported from physics (398). Thus, that utility theory, which continues to inform neoclassical economics, is based on a faulty metaphoric transfer is held to be at the core of the conceptual problems in modern economics.

## **2. Chicago School Tradition in Neoclassical Economics**

As the strongest modern expression of the naive positivist tradition in economics, and as the sub-culture that continues to capture the popular imagination of what economics is about, the influence of the Department of Economics of the University of Chicago is difficult to overstate. Given its pre-eminence, we choose to consider this particular strain over others in appraising the strengths and weaknesses of neoclassical economics. Key features are noted below.

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attributing some property or quality to something to which it ordinarily does not belong, there is a function of metaphor in every interaction between the natural sciences and the social sciences" (36).

### **a. Positive and Normative Economics**

A key characteristic of the Chicago view is the clear distinction made between positive and normative economics. The former considers the nature of the mechanism, what it conditionally might be, and is considered to be value free. The technological role of scientific knowledge is considered unproblematic; possession of this knowledge enables the determination of the best way to accomplish a specified aim. Such aims, based on value judgments of what ought to be and what should be done, are the normative considerations. Reder (1982) cites as example that the state is considered to be an agent that is difficult to monitor and control. More, it is held that the political process will at best waste resources and at worst subvert the process of achievement. Given this positive view, the normative conclusions follow that objectives sought to be implemented through the state's official agents ought to be scrutinized carefully and that control of resources and its associated power ought to be privately retained where possible (31). It should be mentioned, before moving on, that this claim of political inefficiency has been reversed with analysts such as Wittman (1995) arguing that political institutions are as efficient just as market institutions are understood to be.<sup>40</sup>

### **b. Prediction v. Realism**

Milton Friedman, in "The Methodology of Positive Economics," notes that "[t]he ultimate goal of a positive science is the development of a "theory" or "hypothesis" that

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<sup>40</sup> This reversal reveals that Chicago conceptions of "what is" is subject to change. This raises the points of how firmly rooted such representations are and how changes in such beliefs are to be handled.

yields valid and meaningful (i.e., not truistic) predictions about phenomena not yet observed"(1953, 7). The proper role of theory is thus to enable one to make correct inferences about some observables on the basis of other observables. A set of assumptions is put through logical analysis to yield implications and predictions. As such, realism is de-emphasized and the testing of predictions is emphasized in the making of predictive models. As Friedman puts it, "the relevant question to ask about the 'assumptions' of a theory is not whether they are descriptively 'realistic,' for they never are, but whether they are sufficiently good approximations for the purpose in hand. And this question can be answered only by seeing whether the theory works, which means whether it yields sufficiently accurate predictions"(/#M, 15). In sum, the model may be unrealistic but justified if it yields insights, while gaining validity from the strength of predictions it generates.

### **c. Characteristics of the Chicago Research Program**

The New Chicago School, presided over by M. Friedman, Stigler, Lucas, Becker, and Barro, among others, places emphasis on rigorous price theory and the use of statistical techniques. Reder (1982) identifies elements of the generating assumptions (a very strong version of homo-economicus and of expected net wealth maximizing man) as well as of auxiliary assumptions as central to the Program.

*1. Generating Assumptions:* Individuals are considered to have only economic interactions - that is voluntary exchanges of goods and services; all other connections are

ignored. Economic agents are assumed to be well informed, rational, and self-interested wealth maximizers. The rationality assumption holds that individual decision-makers have utility functions whose arguments are defined as alternative uses of endowed resources. As such, it is considered a heuristic device for interpreting behavior and "in this sense, it plays a role similar to that played by maximizing principles used in other sciences (e.g., physics) in generating hypotheses to explicate empirical phenomena" (Hogarth and Reder, 1987,3). Each decision-maker acts as though he were solving a constrained maximization problem.

The axioms of Rational Choice provide the analytical basis for studying such individual choices as are based on preferences. Actions which are known to lead to specific outcomes characterize decisions under certainty. Here, the notion that the individual, given a set of possible acts to choose from, selects one that maximizes a given index of satisfaction rests on the axioms of Completeness, Transitivity, and Continuity.<sup>41</sup> Complementing decisions made under certainty are those made under risk. Von Neumann and Morgenstern have shown that individuals make choices in uncertain situations based on expected utility. In addition, they have demonstrated a way of assigning utility numbers to available prizes.<sup>42</sup> The individual is seen, therefore, to act in

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<sup>41</sup> By Completeness, it is meant that the individual can make paired comparisons to indicate if one is a preferred option or if both are equally attractive. Individuals are not considered to be paralyzed by indecision. The Transitivity axiom implies that if an action A is preferred to B, which is then preferred to C in paired comparison, that A is then preferred to C. Finally, the Continuity axiom states that if A is preferred to B, then situations near A are also superior to B (Luce and Raiffa, 1989, 21).

<sup>42</sup> The scheme is based on the notion that the individual will be indifferent between a gamble and a sure thing if the gamble has a high enough probability of winning. The Von-Neumann-Morgenstern technique

a way to derive the highest von Neumann-Morgenstern utility, a proxy for the utility function (Luce and Raiffa, 1989, 25).

The four foundations for the axiomatic analysis of Expected Utility Theory are noted below: The first, Cancellation, eliminates any state of the world that yields the same outcome regardless of choice. Transitivity, the second axiom, represents preference on an ordinal utility scale, operating when one element does not affect the other to which it is compared. Dominance, the third principle, states that an option that is superior in one respect to other options but equal in other respects should be selected. Finally, Invariance poses that different representations of the same choice should yield the same preference.

*ii. Auxiliary Assumptions:* The Rational Choice paradigm is by itself insufficient to generate price quantity relations that characterize economic models. Specific auxiliary assumptions must be cited for particular applications. These rest on the belief that there are no stable empirical relations among prices, quantities, and disturbances outside a situation that shares the characteristics of a general equilibrium framework. A *Tight Prior Equilibrium*, requires, says Reder, "that decision-makers so allocate the resources under their control that there is no alternative allocation such that any one decision-maker could have his expected utility increased or decreased without a reduction occurring in the expected utility of at least one other decision-maker"(1982,11). The auxiliary assumptions are, then, that individuals are price takers rather than price makers, that

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is to define the utility of the certain option as the expected utility of the gamble that the individual considers equally desirable to the certain option (Nicholson 1989, 243).

markets clear instantaneously, that there exist competitive markets, and that transaction and information costs remain low.

*Hi. Disciplinary Unity:*

Reder notes that the emphasis on conformity to the paradigm provides a distinctive flavor to the contributions of Chicago economists, even if this involves restructuring a model so as to reconcile empirical anomalies. The Chicago view is thus resistant to paradigm disturbing evidence and reluctant to accept disruptive theoretical innovations (Ibid., 21). The result is that the Rational Choice Paradigm provides economics with a disciplinary unity missing in other social sciences (Hogarth and Reder, 1987,4).

## *B. Critiques of Chicago Methodology and Rational Choice Theory*

Criticisms of the approach sketched out above are well known and have touched on all its noted facets. As an epistemological theory, it is seen to be confined within its own deductive logic and thus unable to account for situations without prior rational grounds for doing so. In its emphasis on prediction over realism, it has been criticized for ignoring important elements of social reality such as habits, routines, and rule following behavior. Its axioms have been found to conflict with observed human behavior, while the use of auxiliary assumptions to save theory from unwanted evidence has been alleged.

### **1. Predictive Instrumentalism**

According to Gordon, Friedman's use of the term 'positive', in *The Methodology of Positive Economics*, relates to the empirical content of scientific economics rather than as a contrast to a consideration of normative issues. Gordon thus considers the correct taxonomy to be *Predictive Instrumentalism* which argues that the sole test of an empirical theory lies in the accuracy of its forecasts. As such theories are not required to explain or describe phenomena. This in effect construes science as a "mysterious black box of propositions" where science does not illuminate reality but rather consists of a shadowy set of devices that swears to foretell the future (1993,609). As Gordon notes, "[t]he predictive capacity of a theory is of course an essential consideration in all branches of

applied science, but forecasting is intellectually unsatisfactory unless one has rational grounds for expecting the predicted event to occur" (*Ibid.*).

Hausman (1992) holds that a total assessment of a theory's performance with regard to the phenomena it was designed to explain is not possible and that therefore, Friedman's view, that there is no point in examining a theory's assumptions given the possibility of such a total assessment, is moot. Moreover, notes Hausman, the role of theory is to guide us in circumstances where we do not yet know whether our predictions are already correct and "there is thus much that may be learned by examining the components (assumptions) of a theory and its "irrelevant" predictions"(72). Consideration of the realism of assumptions is therefore of prime importance in evaluating a theory that fails to predict or in extending a theory to new circumstances.

## **2. Teleology**

In describing economic processes in terms of their end point equilibria without providing an explicit account of the dynamics of the process therein, neoclassical economics falls eligible to be called "teleological" (Buchanan and Vanberg, 1991, 185). Rejecting the implication that we are moving towards a destination of equilibrium, radical subjectivists, such as Shackle, Lachmann and Wiseman have held that the economic process is an open-ended and creative one; reality is created by the choices we make and the successive foreclosures thereof through irreversible time.

If we take the concept of teleology and add Stigler's view that the primary purpose of most economists is to increase the knowledge of the economic system, taken as an objectified reality whose form becomes apparent through study<sup>43</sup>, we come up with the notion of the economist as engineer, using equilibrium criteria to judge extant economic constructs with regard to some perceived ultimate ideal (Buchanan, 1960). A belief that the possession of superior knowledge privileges the economist to determine the necessity of accomplishing specific 'corrections' leads to the dangerous determination that it is possible to steer towards determinable and desirable end-states. Not only may "policy levers" devised by the economist-engineer to accomplish this be subject to misuse, but the artificial and coercive maneuverings towards a non-existent end-state may create conditions of tension and confusion within the understandings of the participants of the rule community that underlie the existing constitutional order.

### **3. Homo-economicus limited**

We have noted earlier that the axiomatic foundations of Expected Utility theory rest on the principles of Cancellation, Transitivity, Dominance, and Invariance. However, Tversky and Kahneman have demonstrated that the variations in the framing of decisions produce systematic violations in the Invariance and Dominance axioms of Expected Utility Theory. Invariance fails, they claim, because evaluations of outcomes and

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<sup>43</sup> This may bring to mind the joke about three blindfolded economists who grope different parts of an elephant and come up with differing versions of what the beast is.

probabilities are not linear and because people spontaneously construct "canonical representations" of decisions (1986, 66). Subjective weighing, in addition, is held to result in the violation of the Cancellation axiom in non-transparent problems (*Ibid*, 80).

These doubts as to the foundations of Homo-oeconomics, the rational chooser, lie, at root, with a failure to recognize the cognitive limitations of humans in accumulating and processing information and in neoclassicism's nescience of the role of rules in strategic planning and interaction. Whereas Rational Choice Theory requires the availability of pertinent information as a prelude to choice, the volume and constantly changing nature of information, as well as considerations of what is held to be information, strains the bounds of human cognitive ability. This inability to cope or the excessive costs associated with the gathering of relevant data create, notes Heiner (1983), situations where individuals fail to possess sufficient competence to decisively distinguish or conceive available behavioral options and are thus inadequately equipped to employ rational action.

The view that RCT has overstated human ability has also been expressed by Hayek and Simon. Hayek holds that Rationalism's claim that man can consider explicit evaluations by successful coordination of knowledge of the consequences of each possible choice venture as a "colossal presumption concerning our intellectual powers" and as a "misperception of our world" (1973, 29). Simon observes that to take RCT seriously would require an assumption of "Olympian rationality" in humans. His alternate formulation, expressed as Bounded Rationality, suggests that individuals do the

best that they can based on what they know rather than based on what they might achieve when fully informed (1984, 48). In this respect, individuals "*satisfice*" rather than optimize (Simon, 1959, 263).

#### **4. The Role of Auxiliary Assumptions**

In stressing the need for a more realistic behavioral foundation in economics, it has been pointed out that the explanatory power of orthodox rationality is derived not from the maximization assumptions as such, but rather from the use of auxiliary assumptions to provide a predictive fit. As Simon notes: "It is too easy, within the neoclassical methodological framework, to save the theory from unpleasant evidence by modifying the auxiliary assumptions and providing a new framework within which the actor 'must have been operating'." Hence, neoclassical theory, as usually applied, is an "exceedingly weak theory, as shown by the difficulty of finding sets of facts, actual or hypothetical, that cannot be rationalized and made consistent with it"(1987, 39).

### *C. Change and Adaptation in Equilibrium Economics*

Most critics of neoclassical economics note its static framework and its lack of emphasis on process and change. Though neoclassical economists have of late attempted to develop concepts involving such dynamic aspects, changes in neoclassical theory are always reactive in nature. As Witt (1992) observes, "[i]ndividual agents or economic aggregates are viewed as responding to events that affect the basis of decision making. Economic actors are portrayed as attempting to adapt optimally to new conditions imposed on them. They are not credited in any way with creating the new conditions themselves"(4).

Examples of what Witt refers to are readily observed in Macroeconomic models of Real Business Cycles (RBC). Changes in the economy are brought about by "autonomous shocks" such as shifts in technology or factor availability. Kydland and Prescott (1982) proffer a model that serves as an exemplar for most RBC models: The authors consider a favorable shock to technology, increasing production and demand for labor. In attempting to adjust optimally to their new surroundings, workers and producers must decide how much of the shock is transitory and how much is permanent. Thus, for example, to the degree that workers perceive that the shock is transitory and that real wages are high relative to future real wages, more labor is supplied.<sup>44</sup> Were there no

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<sup>44</sup> To complete the model, to the degree that producers estimate the shock to be permanent, new capital construction is initiated. Given that such capital takes "Time to Build," aggregate output increases for some time after the initial shock.

further shocks to technology, producers and workers would converge on their optimal plans and the economy is brought back to a steady state path.

In a market equilibrium, no agent is motivated to initiate change. As we have seen, the changes that do take place are exogenous, driven by factors other than by the model's restrictive prescription of individual's behavior. To quote Witt again, "[t]he reason for this narrow interpretation is the very core of the neoclassical paradigm, the synthesis of optimization and the equilibrium concept. Used together, these two ingredients rule out any explanation of individual behavior other than that of adapting to changing circumstances" (*Ibid*). As a result, important aspects of change such as entrepreneurial activity, changing preferences, and new ideas and skills in politics and administration are excluded from the scope of neoclassical economics.

## V. Conclusions

We have, to this point, considered how a particular conception of order and change can be used equally to understand issues in Individual Constitutions and in Social Constitutions. Part V begins by drawing out the linkages and interdependencies between these two schemes. Such considerations of the interplay between these frameworks may provide an understanding of the growth and exploitation of knowledge as regards the extent and capacity of individuals to more successfully adapt. This discussion is followed by a brief conclusion regarding the relevance of the approach pursued in this dissertation.

### A. *Frameworks and Linkages*

In attempting to understand the nature of adaptation, we have been able to draw upon our appreciation of conditioned change within rule structures of the Individual Constitution. In brief, we have noted that it may be useful to think in terms of a competition, simultaneous and at different rates, among frameworks at various biological, behavioral and cognitive levels in how they may represent our world. Adaptive change is thus affected by the selection of innovations through competition. At the same time, it was recognized that the scope of innovation and the means of competition are

circumscribed by the presiding institutions. Constraining rules contained within such structures, we noted, direct the attention and innovative efforts of the individual in certain directions while discouraging the same in others.

Accordingly, rules that govern thought processes can be held to provide the framework within which the knowledge of the individual will extend. As such, competition among mental rule frameworks constitutes an explorative learning process where alternate ways of coming to grips with a range of experienced problems are tested and adopted. This is based on the determination of what enhances the adaptive well-being of the individual given his cognitive limitations. This judgment of what constitutes an enhancement of adaptability is, in turn, driven by the more fundamental levels of his mental framework. Similarly, political institutions can be constrained by judgments reflected in constitutional precommitments as to what social rule or configuration of rules might best serve the interests of the constituent or citizen.

An institution whether recognized in human behavior and rationality, in scientific convention, or as a government, can be seen as being made up of a configuration of interconnected and evolving rules. In moving from the Individual to Social Constitutional Frameworks, the proffered approach points to the similarity of structure and the analogous roles that rules play even as the latter rests on the foundations of the former. As to this last point, Vanberg notes that

[social institutions can ... be conceptualized as configurations of interconnecting and mutually-stabilizing behavioral routines. They are constituted by the routine

practices of a number of persons that are functionally interlaced and reinforce each other in a mutually-stabilizing manner. In other words, the building blocks of institutions are individual routines, behavioral patterns or rule-guided actions, and a behavioral theory on which a theory of rules and institutions must be built must, therefore, be able to account for such *rule following behavior* (1994c, 7).

### **1. Shared Cognitive Frameworks as a Basis for Social Institutions**

In Part IV, we considered that social institutions are rooted in the sharing among constituent individuals of a set of particular cognitive outlooks. We now pursue this notion further. Choi (1993), notes that social conventions are analogs of individual paradigms. Choi holds that individuals tend to be committed to a world view based on an associated paradigm: "It is paradigms that provide viewpoints enabling us to distinguish what is relevant for the purpose at hand from what is not. Identifying paradigms is like making inquiries: no answers can be given before the questions are posed"(33). Similarly, social paradigms, as vested in conventions, govern and guide the interaction of individual outlooks (8). As such, the viability of an individual's paradigm within a group rests on the shared association of that paradigm with the other individuals with whom he or she interacts (69).

Hayek (1952) similarly makes the point that any discussion of the phenomenal world would not be possible if individuals did not perceive the world in terms of, at least, a similar order (23). However, the maps formed in each brain of the outside world can never be identical, he avers, as this would imply not only the sharing of an identical history of sensations but also a complete identity of anatomical structure (110). As a

result, individuals can never rest in full confidence that they are correctly reading the actions of others. The degree of confidence that is attached to reading another's actions, considers Hayek, is as much a factor as the interpretation of that action (1967, 60). Given that individuals within a group are more likely to share certain outlooks, individuals may be more confident, and less self-aware, in responding to such signs within their own group than to those from other cultures (46).<sup>45</sup>

## 2. Moral Rules and Behavioral Conditioning

Social order can be based on genetic similarities where the coordination mechanism is hard-wired into the organism<sup>46</sup>, or can be based, at some level of consciousness, on an agreement by the individuals involved. While humans may have non-linked genetic identities in comparison with other species, they have a tremendous capacity to learn and adopt certain types of behavior needed for cooperative social existence. A basic and common repertoire of actions undertaken by constituent individuals under given circumstances act to create the foundation for a predictable social order. In order to derive social order in human societies, this basis of coordination has to be enforced at an individual level; such a basis is created by sublimating certain rules

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<sup>45</sup> This is the point of the Austrian Hermeneutics literature. See Lavioe (1992).

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For example, studies of the naked mole rat have found that its high level of socially cooperative behavior is linked to a high degree of relatedness. The queen is the only female that reproduces, mating with only one to three dominant males, while other members of the colony dig tunnels and collect food. The genetic similarity among mole rats have been calculated to be 80% and their DNA "fingerprints" are indistinguishable. [Susan Okie, "Genetics: Mole Rats and Inbred Sociability." *The Washington Post*, p. A2, 9 April, 1990]

into an emotional commitment by the individual to the social order by the process of conditioning. Thus social order, and the associated advantages of cooperative and coordinative activity, can be considered to be maintained through a conditioned selection among behavioral novelties created by individual innovation.

This selective criteria can be considered to be vested in a moral or ethical code. Through behavioral conditioning, propensities incorporated by the individual into his or her *personal constitution* come to reflect rules that his or her community has agreed to. Rules such as those against dishonesty and theft, reflective of the constitutional interests of individuals in society since they enable the realization of the gains of cooperation, have to be incorporated into the individual's personality, behavioral repertoire, or personal constitution in order to reap the pay-offs. Morality thus reflects a propensity to act in accordance with commonly agreed upon principles. Although individuals may differ in the extent to which they exhibit a disposition towards morality, it can nevertheless be asserted that some basic stock of morals act as a social glue. This common stock of values are frequently maintained and propagated by such institutions as religion and tradition which emphasize regimen and routine in instilling and carrying out the tenants of what is considered behavior beneficial to social harmony.

Commitment to a moral order that individuals have come to habitually and unconsciously obey is fostered by conditioning emotional responses to one's behavioral repertoire. Feelings of remorse, for example, may bias competition among behavioral initiatives to those responses that do not violate moral norms. As Frank notes, a person

with strong guilt feelings will avoid cheating because an aversion to those guilt feelings changes the pay-off structure (1988, 53). Competition among behavioral initiatives, as guided by social conditioning is thus central to generating commitment to a moral order. Such behavioral initiatives are seen to be overt manifestations of the underlying mental representation. As we have reviewed, such representations are produced within the framework of mental institutions. Conditioning of behavior through rewards and sanctions thus modifies the rules within which perception and subsequent action is guided.

Personal Constitutions and Social Order are thus dependent on each other. Social institutions, on one hand, are rooted in the sharing among constituent individuals of a set of cognitive outlooks. On the other hand, the maintenance and coherence of such an outlook among the membership can be affected by the rules and accompanying sanctions that condition the competition among mental models. Such moral rules thus create a predisposition to maintain an adherence to a set of common values that have guided cooperation.

The direction of the adaptive process through the conditioned competition of alternatives at the individual level is guided, in part and at one level, by social rules that are in turn, largely shared by many in the structure of their mental orderings. The success that particular individuals may enjoy in adapting within such a given framework depends on how these social rules are structured. As such, it is dependent on the manner and extent to which this structure is open to evaluation by each participant. The direction of

the adaptive process through the conditioned competition of alternatives among social rules depends on the extent and organization of planes of more fundamental consensus among evaluants. The pace of such adaptive change at each level depends on how the rules of competition at the next higher level are constructed.

### 3. Legitimacy in Social Change

Let us review the points that have been made in summary: First, we noted that social institutions are based on institutions of thought in that they are rooted in the sharing of constituent individuals of certain cognitive outlooks. Second, we found similarity in the architecture of social and cognitive institutions. Both are based on competition conditioned at various levels by the governing rules. If the adaptational adjustments within a level are inadequate, recourse in evaluating that rule with respect to others within the framework of still higher rule levels is considered. Accordingly, and third, change in social institutions can be thought of as being structured similarly to that of in cognitive institutions. Fourth, knowledge created within the constraints of social rules as adopted into an individual's personal constitution is subject to evaluation based on its adaptive use and potential. Psychological adaptation can be to proceed within guidelines that have been acceded to at a social level while social institutions evolve under terms that can bevariously reevaluated through subjective interpretation and reinvented through the initiation of competition conditioned at the next appropriate level. Fifth, the adoption of more explicit understandings of the terms of competition on which



to base social institutions is founded on successively more fundamental levels of consensus on successively more fundamental levels of rules. Thus, change in social institutions so constructed are likely to be considered acceptable and legitimate to the extent that their adoption within and evaluation by the mental framework has evolved within the stability of, and is conditioned through the expectations generated by such successive levels of understanding. Compatibility in change, necessary for cooperation, is fostered through agreement to condition the development of our mental outlook at its various levels through social forums gathered and evaluated at various levels.

*Grau, teurer Freund, ist alle  
Theorie Undgrün des Lebens  
goldner Baum.*

Johann Wolfgang von Goethe

Individuals begin to deal with the complexity of their environment by looking for patterns. As such, induction forms the basis of cognitive models: These models are composed through a configuration of rules with the rules in turn founded on identifying elements that have been categorized with respect to some relevant characteristic. The Darwinian evolutionary perspective provides an understanding of how such cognitive models are amended so as to provide an adaptive fit to the problem situation as perceived. Through trial and error, existing patterns can be reclassified and new ones recognized. Modifications to knowledge are thus made with reference with particular rules or, more fundamentally, with respect to the framework of rules themselves.

Judgment as to what constitutes the problem as well as evaluations of the relevance of putative solutions represent conjectures as to the pertinence of the recognized characteristics as embodied in rules. They thus represent conditional claims as to commitments and constraints within which alternatives in the trial and error process are to be selected. More generally what has been called, an Individual's Constitution refers to such a conditioned competition; simultaneous and at different levels and rates at the various physical, behavioral and epistemological planes.

This theme of evolutionary adaptation within constraints is echoed by Hayek in discussing the sensory order of the mind. We have shown that such a conception can be equally applied to interpret order and change in the context of individual adaptation via human interaction. What is referred to as a Social Constitution thus alludes to conditioned competition, simultaneous and at different rates and levels at the various forums of social rule making and revision.

We have shown in what ways a theory of social institutions can be part of a broader framework that includes a particular theory of human-knowledge and behavior, all within a thorough going evolutionary theory. Its foundations in subjectivism and individualism have enabled a consistent account of the issues of order and change that can be applied to understand the full spectrum of human action, whether within a personal or social setting.

## LIST OF REFERENCES

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- Ackerman, B. (1991). *We the people*. Cambridge MA: Belknap Press of Harvard University Press.
- Alchian, Armen, A. (1950). Uncertainty, evolution, and economic theory. *Journal of Political Economy*, L VIII, 211-21.
- Arrow, K. (1951). *Social choice and individual values*. New York: Wiley.
- Arthur, W. B. (1994). Complexity in economic theory; Inductive reasoning and bounded rationality. *AEA Papers and Proceedings*, 84 (2).
- Axelrod, R. (1984). *The evolution of cooperation*. New York: Basic Books.
- Baars, B. J. (1986). *The cognitive revolution in psychology*. New York: Guilford Press.
- Basalla, G. (1988). *The evolution of technology*, Cambridge; New York: Cambridge University Press.
- Benson, B. L. (1989). The spontaneous evolution of common law. *Southern Economic Journal*. 55.
- Berman, H. J. (1983). *Law and revolution, The formation of the western legal tradition*. Cambridge MA: Harvard University Press.
- Berns, L. (1987). Thomas Hobbes. In L. Strauss & J. Cropsey (Eds.), *History of political philosophy*. Chicago and London: University of Chicago Press.
- Blaug, M. (1976). Kuhn versus Lakatos or paradigms versus Research programs in the history of economics. In S. Latsis (Ed.), *Method and appraisal in economics*. Cambridge: Cambridge University Press.
- Boyd, R. & Richardson, P. J. (1980). Sociobiology, culture and economic theory. *Journal of Economic Behavior and Organization*, 1 (2), 97-121
- Brennan, G. (1990). What might rationality fail to do? In K. S. Cook & M. Levi (Eds.), *The limits of rationality*. Chicago: University Chicago Press.
- Brennan, G. & Buchanan, J. M. (1985). *The reason of rules - Constitutional political economy*. Cambridge: Cambridge University Press.

- Brennan, G. & Kliemt, H. (1990). Logo Logic. *Constitutional Political Economy* 1(1): 125-127.
- Bruner, X, Goodnow, X S., & Austin, G. A. (1990 ). *A study of thinking*. New Brunswick, NX\* Transaction Publishers. (Original work published 1956).
- Buchanan, A. (1991). *Secession*. San Francisco: Westview Press.
- Buchanan, XM. (1960). Fiscal theory and political economy. Chapel Hill: University of North Carolina Press.
- Buchanan, XM. (1962). The relevance of Pareto optimality. *The Journal of Conflict Resolution* 6: 341 -354.
- Buchanan, X M. (1969). *Cost and choice -An inquiry in economic theory*. Chicago: University of Chicago Press.
- Buchanan, X M. (1975). *The limits of liberty, Between anarchy and leviathan*. Chicago: University of Chicago Press.
- Buchanan, X M. (1979a). *Methods and morals in economics*. In. *what should economists do?* Indianapolis: Liberty Press.
- Buchanan, XM. (1979b). *General implications for subjectivism in economics*. In *What should economists do?* Indianapolis: Liberty Press.
- Buchanan, XM. (1985). Political economy and social philosophy. In P. Koslowski (Ed.), *Economics and philosophy*. Tubingen: XC.B. Mohr [Paul Siebeck]
- Buchanan, X M. (1987). Constitutional economics. *The New Palgrave -A Dictionary of Economics* 1, 585-8.
- Buchanan, X M. (1989). *The relatively absolute absolutes*. In *Essays on the political economy*. Honolulu: University of Hawaii Press.
- Buchanan, X M. (1989b). *The ethics of constitutional order*. In *essays on the political economy*. Honolulu: University of Honolulu Press.
- Buchanan, XM. (1990). The domain of constitutional economics, *Constitutional Political Economy* 1, 1-18.
- Buchanan, X M. (1991a). On the structure of an economy: A reemphasis on some classical foundations. *The economics and ethics of constitutional order*. Ann Arbor: University of Michigan Press. (Original work published 1989).
- Buchanan, XM. (1991b). The foundations for normative individualism. *The economics and ethics of constitutional order*. Ann Arbor: University of Michigan Press.
- Buchanan, X M. & Tullock, G. (1962). *The calculus of consent - Logical foundations of constitutional democracy*. Ann Arbor: University of Michigan Press.

- Buchanan, J. M. & Vanberg, V. J. (1988). Rational choice and moral order. *Analyse & Kritik*, 10,138-160.
- Buchanan, J. M. & Vanberg, V. J. (1989). Interests and theories in constitutional choice. *Journal of Theoretical Politics*, 1, 49-62.
- Buchanan, J. M. & Vanberg (1991). The market as a creative process. *Economics and Philosophy*, 7,167-86.
- Burian, R. M. (1992). Adaptation: Historical perspectives. In E.F. Keller and E.A. Lloyd (Eds.), *Keywords in evolutionary biology*. Cambridge and London: Harvard University Press.
- Campbell, D.T. (1975). On the conflict between biological and social evolution and between psychology and moral tradition. *American Psychologist*, 30, 1103-26.
- Cantner, U. & Hanusch, H. (1994). Joseph Alois Schumpeter. In Hodgson, Samuels & Tool (Eds.), *Institutional and evolutionary economics*. Aldershot, Hants: Edward El gar.
- Catania, A. C. (1988). The operant behaviorism of B.F. Skinner. In A. C. Catania & S. Harnard (Eds.) *The selection of behavior, The operant behaviorism of B.F. Skinner, Comments and consequences*. (Eds.), Cambridge: Cambridge University Press
- Choi, Y. B. (1993). *Paradigms and conventions: Uncertainty, decision making and entrepreneurship*. Ann Arbor: University of Michigan Press.
- Chomsky, N. (1959). Review of Skinner's *Verbal Behavior*. *Language*, 35, 26-58.
- Cohen I. B. (1993). Analogy, homology, and metaphor in the interactions between the natural sciences and the social sciences, especially economics. In Neil de Marchi (Ed.), *Non-natural social science: Reflecting on the enterprise of more heat than light*. Durham & London: Duke University Press.
- Coleman, J. S. (1987). Norms as social capital. In G. Radnitzky and P. Bernholtz (Eds.), *Economic imperialism - The economic approach applied outside the field of economics*. New York: Paragon House Publishers.
- Coleman, J. S. (1990). Norm generating structures. In K. S. Cook & M. Levi (Eds.), *The limits of rationality*. Chicago: University of Chicago Press.
- Commons, J. R. (1931). Institutional economics. *AER* 21, 648-57.
- Commons, J. R. (1934). *Institutional economics - Its place in political economy*. New York: Macmillan.
- Coppleston, F. S. J. (1985). *The history of philosophy*. New York: Bantam, Doubleday, Dell.

- Darwin, C. (1958). *The autobiography of Charles Darwin*. (Nora Barlow., Ed.) New York: Norton.
- Darwin C. ( 1955 ) *The descent of man and selection in relation to sex*. Chicago: Encyclopedia Britannica. (Original work published 1871).
- Darwin, C. (1971). *Origin of the species*. Adelaide: Limited Editions Club. (Original work published 1859).
- Dawkins, R. (1976). *The selfish gene*. Oxford: Oxford University Press.
- Dorfman, J. (1949). *The disturbing voice of Thorstein Veblen*. In *The economic mind in American civilization* 3. New York: A.M. Kelly.
- Durkheim, E. (1958). *The rules of the sociological method*. {8th Ed) (G. E.G. Catlin, Ed.). Glencoe 111: Free Press.
- Eldredge, N. & Gould, S. J. (1972). Punctuated equilibria: an alternative to phyletic gradualism. In T.J.M. Schopf (Ed.), *Models in paleobiology*. San Fransisco: Freeman, Cooper
- Elster, J. (1979). *Studies in rationality and irrationality*. Cambridge: Cambridge University Press.
- Elster, J. (1979). *Ulysses and the Sirens*. Cambridge: Cambridge University Press.
- Endler (1992). Natural Selection. In E.F. Keller & E.A. Lloyd (Eds.), *Keywords in evolutionary biology*. Cambridge and London: Harvard University Press.
- Foster (1994). In Hodgson, Samuel & Tool (Eds.), *Institutional and evolutionary economics*. Aldershot, hants: Edward El gar.
- Frank, R. H. (1988). *Passions within reason, The strategic role of emotions*. New York: W.W. Norton & Co.
- Freeman, C. (1987). *Technology policy and economic performance: Lessons from Japan*. London, New York: Pinter.
- Freeman, C. (1990). Schumpeter's *Business Cycles* revisited. In A. Heertje & M. Perlman (Eds.), *Evolving technology and market structure - Studies in Schumpeterian economics*. Ann Arbor: University of Michigan Press, 17-38.
- Friedman, M. (1953). The methodology of positive economics. *Essays in positive economics*. Chicago: University of Chicago Press.
- Glietman, H. (1986). *Psychology*. New York: W.W. Norton & Co.
- Gould, S. J. (1980). Is an new and general theory of evolution emerging? *Paleobiology* 6: 119-30.

- Gould, S. J. (1982). The meaning of punctuated equilibrium and its role in validating a hierarchical approach in to macroevolution. In R. Milkman (Ed.), *Perspectives on evolution*. Sunderland MA: Sinauer Associates: 83-104.
- Gowdy, J. M. (1985). Evolutionary theory and economic theory: some methodological issues. *Review of Social Economy*, XLIII (3), 316-214.
- Gordon, S. (1993). *The history and philosophy of social science*. London and New York: Routledge.
- Hamilton, W. D. (1964). The genetical theory of social behavior. *Journal of Theoretical Biology*.
- Hampton, J. & Dubois, D. (1993). Psychological models of concepts: Introduction. In I.V. Mehlen, J. Hampton, R.S. Michalski & P. Theuns (Eds.), *Categories and Concepts*. New York: Academic Press.
- Hands, D. W. (1993). Popper and Lakatos in economic methodology. In U. Maki, B. Gustaffson and C. Knudsen, (Eds.), *Rationality, institutions, and economic methodology*. London: Routledge.
- Harsanyi, J. C. (1977). *Rational behavior and bargaining equilibrium in games and social situations*. Cambridge: Cambridge University Press.
- Hausman, D. M. (1994). Introduction. In D.M. Hausman (Ed.), *The philosophy of economics*. Cambridge: Cambridge University Press.
- Hayek, F. A. von (1937). Economics and knowledge. *Economica*, 12, 33-54. (Reprinted in F.A. Hayek (1948). *Individualism and economic order*. Chicago: University of Chicago Press.)
- Hayek, F. A. von (1945). The use of knowledge in society. *AER*, 35, 519-30. (Reprinted in F.A. Hayek (1948). *Individualism and economic order*. Chicago: University of Chicago Press.)
- Hayek, F. A. Von (1948). The facts of the social sciences. *Individualism and economic order*. Chicago: University of Chicago Press.
- Hayek, F. A. von (1952). *The sensory order -An inquiry into the foundations of theoretical psychology*. Cambridge: University of Cambridge Press.
- Hayek, F. A. von (1960). *The constitution of liberty*. Chicago: University of Chicago Press.
- Hayek, F. A. von (1964). Kinds of order in society. *New Individualist Review*, 3, (2), 3-12.
- Hayek, F. A. von (1967). Notes on the evolution of systems of rules of conduct. *Studies in philosophy, politics, and economics*. London: Routledge & Kegan Paul.

- Hayek, F. A. von (1973). *Law, legislation and liberty 1, Rules and order*, Chicago: University of Chicago Press.
- Hayek, F. A. von (1976). *Law, legislation and liberty 2, The mirage of social justice*. London: Routledge & Kegan Paul.
- Hayek, F. A. von (1978). *Competition as a discovery procedure. In New studies in philosophy, politics, economics, and the history of ideas*. Chicago: University of Chicago Press.
- Hayek, F. A. von (1979). *Law, legislation and liberty 3, The political order of a free people*. London: Routledge & Kegan Paul.
- Hayek, F. A. von (1988). *The fatal conceit: The errors of socialism; Collected works of F.A. Hayek 1*. (W. Bartley, Ed.). London: Routledge.
- Heiner, R. (1983). The origin of predictable behavior. *AER*, 73, 560-595.
- Hirshleifer, J. (1982). Evolutionary models in economics and law: Cooperation versus conflict strategies. *Research in law and economics*, 4, 160.
- Hirschman, A. O. (1970). *Exit, voice, and loyalty*. Cambridge MA: Harvard University Press.
- Hobbes, T. (1943). *Leviathan*, London: Everymans Library
- Hogarth, R.M. & Reder, M.W. (Eds.) *Rational choice - The contrast between economics and psychology*. Chicago and London: University of Chicago Press.
- Holland, J. H., Holyoak, K. J., Nisbitt, R. W., & Thagard, P. R. (1986). *Induction - Processes of inference, learning, and discovery*. Cambridge MA: The MIT Press.
- Horwitz, S. (1992). Rules, institutions, and the evolution of economic order. *Monetary evolution, free banking and economic order*.
- Hume, D. (1967). *A treatise of human nature*. Oxford: Clarendon Press.
- Hume, D. (1975). *Enquiries concerning human understanding and concerning the principles of morals*. Oxford: Clarendon Press.
- Hume, D. (1987). *Essays moral, political and literary*. Indianapolis: Liberty Press. (Original work published 1777).
- Hutt, W. H. (1990) Consumer's Sovereignty. *In Economists and the public; a study of competition and opinion*. New Brunswick N. J.: Transaction Publishers. 257-272. (Original work published 1936).
- Iwai, K. (1984). Schumpeterian dynamics: An evolutionary model of innovation and imitation. *Journal of Economic Behavior and Organization*, 5 (2), 159-90.

- Knudsen, C. (1993). Modelling rationality, institutions and processes in economic theory. In U. Maki, B. Gustafsson & C. Knudsen (Eds.) *Rationality, institutions & economic methodology*. London: Routledge.
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Kydland, F. E. & Prescott, E. C. (1982). Time to build and aggregate fluctuations. *Econometrica*, 50 (6), 1345-69.
- Lachmann, L. M. (1971). *The legacy of Max Weber*. Berkeley: University of California Press.
- Lachmann, L. M. (1977). Complementarity and substitution in the theory of capital. *Capital, expectations and the market process*. Kansas City: Sheed, Andrews and McMeel Inc.
- Lachmann, L. M. (1978). *Capital and its structure*. Kansas City: Sheed, Andrews and McMeel Inc.
- Lakatos, I. (1970). Falsification and the methodology of scientific research programs. In I. Lakatos & A. Musgrave (Eds.), *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press.
- Lakatos, I. (1978). *The methodology of scientific research programmes*. Cambridge, New York: Cambridge University Press.
- Lancaster, K. J. (1966). A new approach to consumer theory. *JPE*, 14, 132-157.
- Langlois, R. N. (1986). The new institutional economics: an introductory essay. Rationality, institutions, and explanation. In R. N. Langlois (Ed.), *Economics as a process, Essays in new institutional economics*. Cambridge: Cambridge University Press
- Lavoie, D. (1990). Understanding differently: hermeneutics and spontaneous order of communicative processes. *History of political economy*. Annual supplement to volume 22:359-378.
- Leibenstein, H. (1980). Microeconomics and X-efficiency theory. *The Public Interest*. (Special issue on *The Crisis in Economic Theory*), 97-110.
- Littlechild, S. C. (1986). Three types of market process. In R. N. Langlois (Ed.), *Economics as a process - Essays in the new institutional economics*. Cambridge: Cambridge University Press.
- Loasby, B. (1983). Knowledge, learning and enterprise. In J. Wiseman (Ed.), *Beyond positive economics?* New York: St. Martin's Press, 104-21.

- Loasby, B. (1986). Organization, competition, and the growth of knowledge. In R. N. Langlois (Ed.), *Economics as a process - Essays in the new institutional economics*. Cambridge: Cambridge University Press.
- Loasby, B. (1989). *The mind and method of the economist'. A critical appraisal of major economists in the 2(f century*. Aldershot, Hants: Edward Elgar.
- Loasby, B. (1993). Institutional stability and change in science and the economy. In U. Maki, B. Gustaffson & C. Knudsen (Eds.), *Rationality, institutions, & economic methodology*, London: Routledge.
- Locke, J. (1979). *An essay concerning human understanding*. ( R.H. Nidditch, Ed.). Oxford: Clarendon Press; New York: Oxford University Press.
- Luce, R. D. & Raiffa. H. (1989). Utility theory. In P. K. Moser (Ed.) *Rationality in action*. Cambridge: Cambridge University Press.
- Maki, U. (1993). Economics with institutions: Agenda for methodological enquiry. In U. Maki, B. Gustaffson & C. Knudsen (Eds.), *Rationality, institutions, & economic methodology*. London: Routledge.
- Malthus, T. (1970). *An essay on the principle of population*. London: Penguin Books. (Original work published 1789).
- Matthews, R.C.O. (1984). Darwinism and economic change. In D.A. Collard, N.H. Dimsdale, D.R. Helm, M.F.G. Scott, & A.K. Sen (Eds.), *Economic theory and Hicksian themes*. Oxford: Clarendon Press, 91-117.
- Mayr, E. (1982). *The growth of biological thought*. Cambridge MA and London: The Belknap Press of Harvard University.
- Menger, C. (1976). *Principles of Economics*. New York: New York University Press.
- McKelvy, M. (1994). National systems of innovation. In Hodgson, Samuels, & Tool (Eds.) *Institutional and Evolutionary Economics*. Aldershot, Hants: Edward Elgar.
- McNally, D. (1988). *Political economy and the rise of capitalism -A reinterpretation*. Berkeley: University of California Press.
- Metcalfe, S. (1989). Evolution and economic change. In A. Silberston (Ed.), *Technology and Economic Progress.*, London: Macmillan Press, 54 85.
- Meuller, D. C. (1986). Rational egoism versus adaptive egoism as fundamental postulate for a descriptive theory of human behavior. *Public Choice*, 51, 3-23.
- Michalski, R. S. (1993). Beyond prototypes and frames: the two tiered concept representation. In I.V. Mechelen, J. Hampton, R.S. Michalski & P. Theuns. (Eds.), *Categories and concepts*. New York: Academic Press.
- Mirowski, P. (1989). *More heat than light*. Cambridge: Cambridge University Press.

- Mises, L.von (1966). *Human action, A treatise on economics*. Chicago: Contemporary Books.
- Nelson, R. R. (1994). Routines. In Hodgson, Samuels & Tool (Eds.), *Institutional and evolutionary economics*. Aldershot, Hants: Edward Elgar.
- Nelson, R. R. & Winter, S. G. (1977). In search of useful theory of innovation. *Research Policy*, 5,36-76.
- Nelson, R. R. & Winter, S.G. (1980). Firm and industry response to changed market conditions: An evolutionary approach. *Economic Inquiry*, XVIII (2), 179-202.
- Nelson, R. R. & Winter, S. G. (1982). *An evolutionary theory of economic change*. Cambridge MA: Harvard University Press.
- North, D. C. (1981). *Structure and change in economic history*. New York: W.W. Norton &Co.
- North, D. C. (1987). Institutions, transaction costs and economic growth. *Economic Inquiry*. XXV, 419-428.
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.
- Popper, K. R. (1962). *Conjectures and refutations; the growth of scientific knowledge*. New York: Basic Books.
- Popper, K. R. (1968). *The logic of scientific discovery*. New York: Harper & Row.
- Popper, K. R. (1970). Normal science and its dangers. In I. Lakatos & A. Musgrave (Eds.), *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press.
- Popper, K. R. (1972). *Objective knowledge - an evolutionary approach*. Oxford: Oxford University Press.
- Ramstad, Y. (1994). Thorstein Veblen. In Hodgson, Samuels & Tool (Eds.), *Institutional and evolutionary economics*. Aldershot, Hants: Edward Elgar.
- Reder (1982). Chicago Economics: permanence and change. *JEL* 20:1-38.
- Rosenberg, A. (1992). Altruism: Theoretical contexts, In E.F. Keller & E.A. Lloyd (Eds.), *Keywords in evolutionary biology*. Cambridge and London: Harvard University Press.
- Rosenberg, N. & Birdzell Jr., L. E. (1986). *How the west grew rich - The Economic transformation of the industrial world*. Basic Books
- Rowe, N. (1989). *Rules and institutions*. Ann Arbor: University of Michigan Press.
- Ropke, W. (1960). *A human economy - The social framework of the free market*.
- Ropke, W. (1969). *Against the tide*. Chicago: Henry Regnery Co.

- Ruse, M. (1993). *The Darwinian paradigm*. London: Routledge
- Schelling, T. C. (1978). *Micromotives and Macrobehavior*, New York: W.W. Norton & Co.
- Schelling, T. C. (1984). Self-command in practice, in policy, and in a theory of rational choice. *AER Papers and Proceedings*, 74.
- Schelling, T. C. (1984). *Choice and consequences - Perspectives of an errant economist* Cambridge MA: Harvard University Press.
- Schelling, T. C. (1985). Enforcing Rules on Oneself. *Journal of Law, Economics, and Organization*, 1,(2).
- Schumpeter, J. A. (1928). The instability of capital. *Economic Journal*, XXXVIII (151), 361-86.
- Schumpeter, J. A. (1942). *Capitalism, socialism and democracy*. New York: Harper & Row.
- Schumpeter, J. A. (1947). The creative response in economic history. *Journal of Economic History*, VII (2), November, 149-59.
- Schweber, S. S. (1977). The origin of the *Origin* revisited. *Journal of the History of Biology*, 10(2), Fall, 229-316.
- A.K. (1979). Rational fools: a critique on the behavioral foundations of economic theory. In F. Hahn and M. Hollis (Eds.), *Philosophy and economic theory*. New York: Oxford University Press, 89-109.
- Shackle, G.L.S. (1992). *Epistemics and economics*. New Brunswick NJ: Transaction Books. (Original work published 1972).
- Shepard, R. N. (1987). Towards a universal law of generalization for psychological science. *Science*, 11,1317-1323.
- Shivakumar, S. J. (1991). Rationality and rule following as an issue in social science - On the relevance of recent contributions to an economic theory of rules. Unpublished Master's dissertation, George Mason University, Fairfax, VA.
- Simon, H. A. (1959). Theories of decision-making in economics and behavioral science. ;, *AER*, XLIX.
- Simon, H. A. (1962). The architecture of complexity. *Proceedings of the American philosophical society*, 106 (6), 467-82.
- Simon, H. A. (1984). On the behavioral and rational foundations of economic dynamics. *Journal of Economic Behavior and Organization* 5, 35-55.
- Simon, H. A. (1986). Interview with Herbert A. Simon. In B. J. Baars (Ed.), *The Cognitive revolution in psychology*. New York: Guilford Press.

- Simon, H. A. (1987). Rationality in psychology and economics. In R.M. Hogarth & M.W. Reder (Eds.), *Rational choice - the contrast between economics and psychology*. Chicago and London: University of Chicago Press, 25-40.
- Simon, H. A. (1990). A mechanism for social selection and successful altruism. *Science*, 250,1665-1668
- Sinn, S. (1992). The taming of leviathan: competition among governments. *Constitutional Political Economy* 2,117-96.
- Skinner, B.F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.
- Skinner, B.F. (1966). The phylogeny and ontogeny of behavior. *Science*, 153, 1205-1213.
- Skinner, B.F. (1988). An operant analysis of problem solving. In C. Catania and S. Harnard (Eds.), *The selection of behavior, The operant behaviorism of B.F. Skinner*. Cambridge: Cambridge University Press, 11-20. (Original work published 1966).
- Skinner, B.F. (1988). Selection by consequences. In C. Catania and S. Harnard (Eds.), *The selection of behavior, The operant behaviorism of B.F. Skinner*. Cambridge: Cambridge University Press, 218-236. (Original work published 1981).
- Smith, A. (1980). History of astronomy. In W.P.D. Wightman (Ed.), *Essays on Political Subjects*. Oxford: Oxford University Press.
- Smith, A. (1982). *The theory of moral sentiments*. Indianapolis: Liberty Press. (Original work published 1759).
- Smith, A. (1981). *An inquiry into the nature and causes of the wealth of nations*. Indianapolis: Liberty Press. (Original work published 1776).
- Stigler, G. J. & Becker, G. S. (1978). De gustibus non est disputandum. *AER*, 61 (2).
- Streit, M. E. (1993). Cognition, competition, and catallaxy, In memory of Friedrich August von Hayek. *Constitutional Political Economy*, 4 (2).
- Streit, M. E. & Wegner, G. (1992). Information, transactions and catallaxy: Reflections on some key concepts of evolutionary market theory. In U. Witt (Ed.) *Explaining process and change -Approaches to evolutionary economics*. Ann Arbor: University of Michigan Press.
- Sudgen, R. (1989). Spontaneous order. *Journal of Economic Perspectives*, 3 (4), 85-97.
- Tversky, A. & Kahneman, D. (1986). Rational choice and the framing of decisions. In K.S. Cook & M. Levi (Eds.), *The limits of rationality*. Chicago: University of Chicago Press.

- Twight, C. (1992). Constitutional renegotiation: Impediments to consensual revision. *Constitutional Political Economy*, 3 (1) 89-112.
- Ullmann-Margalit, E. (1977). *The emergence of norms*. Oxford: Clarendon Press.
- Ullmann-Margalit, E. (1978). Invisible hand explanations. *Synthese*, 39,263-91.
- Vanberg, V. J. (1978). Markets and organizations: Towards an individualistic theory of collective action. *Mens en Maatschappij*, 53.
- Vanberg, V. J. (1983). The rebirth of utilitarian sociology. *The Social Science Journal*, 20 (3), 71-78.
- Vanberg, V. J. (1986a). Individual choice and institutional constraints: The normative element in classical and contractarian liberalism. *Analyse & Kritik* 8, 113-149.
- Vanberg, V. J. (1986b). Spontaneous market order and social Rules: Acritical examination of F.A. Hayek's theory of cultural evolution. *Economics and Philosophy*, 2 (1), 75 100.
- Vanberg, V. J. (1989a). Carl Menger's evolutionary and John R. Commons's collective action approach to institutions: a comparison. *Review of Political Economy*, 1(3).
- Vanberg Viktor J. (1989b). Hayek as constitutional political economist. *Wirtschaftspolitische Blater*, 36, 170-182.
- Vanberg, V. J. (1991) Review of Ordo. *Constitutional Political Economy*, 2, 397-402.
- Vanberg, V. J. (1992). Innovation, cultural evolution, and economic growth. In U. Witt (Ed.), *Explaining process and change - Approaches to evolutionary economics*. Ann Arbor: University of Michigan Press.
- Vanberg, V. J. (1993a). Rational choice, rule following and institutions; An evolutionary perspective. In U. Maki, B. Gustafsson & C. Knudsen (Eds.), *Rationality, institutions, and economic methodology*. London; New York: Routledge.
- Vanberg, V. J. (1993b). Rational choice vs. adaptive rule-following: On the behavioral foundations of the social sciences. *Jahrbuchfur Neue Politische Okonomie*, 12. (Tubingen: J.C.B. Mohr [Paul Siebeck]).
- Vanberg, V. J. (1993 c). Constitutionally constrained and safeguarded competition in markets and politics with reference to a European constitution. *Journal des Economistes et des Etudes Humaines*, 4, (1), 3-27.
- Vanberg, V. J. (1994a). Cultural evolution, collective learning, and constitutional design. In D. Reisman (Ed.), *Economic thought and political theory*. Boston, Dordrecht, London: Kluwer Academic Publishers.

- Vanberg, V. J. (1994b). Hayek's legacy and the future of liberal thought: Rational liberalism vs. evolutionary agnosticism. *Journal des Economistes et des Etudes Humaines*, 5(4), 451-481.
- Vanberg, V. J. (1994c). Introduction: Economics as social theory. *Rules and choice in economics*, London: Routledge
- Vanberg, V. J. (1994d). Liberal evolutionism and contractarian constitutionalism. In *Rules and choice in economics*. London: Routledge. (Originally published 1983).
- Vanberg, V. J. (1994e). Friedrich A. Hayek. In Hodgson, Samuels & Tool (Eds.), *Institutional and evolutionary economics*. Hants: Edward Elgar.
- Vanberg, V. J. & Buchanan, J. M. (1991). Constitutional choice, rational ignorance and the limits of reason. *Jarbuch für Neue Politische Ökonomie*, 10, 65-78.
- Vanberg, V. J. & Kerber, W. (1994). Institutional competition among jurisdictions. *Constitutional Political Economy*, 5(2), 193-219.
- Vaughn, K. I. (1991). *Austrian economics in America; the migration of a tradition*. Cambridge; New York: Cambridge University Press.
- Veblen, T. (1909). The limitations of marginal utility. *Journal of Political Economy*, 17, 620-636.
- Veblen, T. (1919). Why is economics not an evolutionary science? In *The place of science in modern civilization and other essays* (pp. 56-81). New York: Russell & Russell.
- Wade, R. (1985). The market for public office: Why the Indian state is not better at development. *World Development*, 5(4), 467-497.
- Wagner, R. E. (1992). Crafting social rules: Common law vs. statute law, once again. *Constitutional Political Economy*, 3 (3).
- Wehr, M. R., Richards Jr., J. A. & Adair, T. W. (1984). *Physics of the atom*. 4th Ed. Reading MA: Addison-Wesley Co.
- Williams, G.C. (1966). *Adaptation and natural selection: a critique of some current evolutionary thought*. Princeton: Princeton University Press.
- Wilson, D. S. (1992). Group Selection. In E.F. Keller & E.A. Lloyd (Eds.) *Keywords in evolutionary biology*. Cambridge and London: Harvard University Press.
- Wilson, E. O. (1980). *Sociobiology - the abridged edition*. Cambridge MA: Harvard University Press.
- Winter, S. G. (1971). Satisficing, selection, and the innovating remnant. *Quarterly Journal of Economics*, LXXXV (2), 237-61.

- Wiseman, J. (1990). Principles of political economy: An outline proposal, illustrated by application to fiscal federalism. *Constitutional Political Economy*, 1 (1), 101-124.
- Witt, U. (1985). Coordination of individual economic activities as an evolving process of self organization. *Economic Apliquee*, XXXVII, 569-95.
- Witt, U. (1987). How transaction rights are shaped to channel innovativeness. *Journal of Institutional and Theoretical Economics*, 143, 180-95.
- Witt, U. (1992). *Evolution as a theme of a new heterodoxy in economics*. In *Explaining process and change: Approaches to evolutionary economics*. Ann Arbor: University of Michigan Press.
- Witt, U. (1993). *Introduction*. In *Evolutionary economics*. Aldershot, Hants, England: Edward Elgar.
- Wynne-Edwards, V.C. (1962). *Animal dispersion in relation to social behavior*. Edinburgh: Oliver and Boyd.

## **CURRICULUM VITAE**

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