WHERE HAVE WE BEEN AND WHERE ARE WE GOING?

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I

Increasing our knowledge of the nature of economic change requires that we utilize the only laboratory we have—the past. But to understand the past we must impose order on the myriad facts that have survived to explain what has happened; and doing so requires theory. The theories we develop to understand where we have been come from the social sciences. There is a constant give and take between the theories we develop and their application to explain the past. Do they improve our understanding—is the resultant explanation broadly consistent with the surviving historical evidence? The first issue that concerns us in this essay is just how good is our understanding of the past?

The second issue is just how useful is a good understanding of the past for solving present and future problems? Can the gradual accretion of "sound" explanations of the past help in understanding where we are going? That depends on the degree to which there are lessons from history. If there are lessons they are not those that are the bread and butter of politicians, statesmen,and soothsayers. Rather they would be the persistent features of the human landscape that are the underlying interrelationships between the rules of the game that humans devise to structure human interaction and the way those rules evolve in the interaction between humans and their environment; an environment which changes as a result not only of external natural forces but also because of changes induced by the players themselves. It is the interaction between the evolving beliefs and preferences of the players, the consequent institutions they create to structure human interaction, and the way those institutions shape economic performance that is an enduring feature of the human landscape and the subject of this essay.

I want first to assess what we have learned from the past and the usefulness of the tools at hand—ie the rationality assumption and growth theory we employ in economics. I then shall attempt to develop better tools in order to gain an understanding of what have been permenent features of the human landscape.

These should provide some clues as to where we are going--or at least an agenda for research on the subject.

II

The overall process of evolution involves three stages: (1) the physical and chemical evolution of the stars and planets, (2) biological evolution starting with DNA and development of living species, and (3) societal evolution starting with homo sapiens.(see Boulding, in The Journal of Evolutionary Economics , vol I, 1, pp 9-17). Stage one is a given in our analysis. Stage two, concerned with the evolving genetic structure of humans—particularly the way the mind has evolved and the development of language—plays a major role in the third stage, societal evolution.

The first great discontinuity in societal evolution was the development of agriculture, which took place almost four million years after human beings became separate from other primates—that is, only ten thousand years ago. It probably evolved independently in different parts of the world at different times and may have resulted from some combination of constriction of the environment and local population pressure (North and Thomas, 1977). Whatever the source, agriculture provided the conditions for civilization both by expanding the productive potential of humans and establishing the sedentary conditions that made possible the growth of specialization and division of labor.

In the ensuing ten thousand years the rate of change appears to have been very slow for at least the first half of that period, although the surviving archaelogical evidence has been scarce. In the second half, it has been episodic for most of the time; periods of what appear to have been economic growth in particular geographic regions have been interrupted by stagnation and decline and sometimes those geographic areas have failed to recover. Athens in the fifth century B.C., Rhodes in the third century B.C., and Rome in the early Empire are examples of growth followed by decline and failure to recover for centuries. Following the demise of Rome in the West there was a long hiatus until the beginning of revival in the tenth century. With Mohammed came expansion of the Muslim world in North Africa and beyond. And in the Far East

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Chinese dynasties produced enormously rich cultures, although it remained for the relatively backward area of Western Europe to be the incubator of modern growth.

If modern economic growth had its genesis in the tenth century revival of Western Europe, sustained growth appears to have begun perhaps four hundred years ago but been confined to a small part of the earth for most of that time—Western Europe and the overseas settlements of England. Widespread growth is a recent phenomenon mostly dating since World War II. Even today large parts of the world are not experiencing growth (eg the republics of the ex Soviet Union and Sub Saharan Africa), or growth continues to be episodic (eg Latin America).

III

How useful are our tools of analysis? The rational choice paradigm assumes that people know what is in their self interest and act accordingly, or at the very least that competition will weed out those who make incorrect choices and reward those who make correct choices. But it is impossible to reconcile this argument with the historical and contemporary record briefly outlined above.

Growth theory as it has evolved from neo-classical theory is equally unhelpful in explaining this historical and contemporary record. Convergence of the growth paths of economies (Baumol 1986) has tended to occur only among the developed countries. Persistent divergence as argued among some of the new growth theory variants of the Solow model cannot explain the rise of the Asian tigers or China. In fact, to put it bluntly, the growth theory stemming from neo-classical economics, old or new, suggests not only ignorance of the empirical evidence, historical or contemporary, but a failure to recognize that incentives matter—surely a remarkable position for economists whose theory is built around incentives.

It has to be the incentive structure imbedded in the institutional/organizational structure of economies that is a key to unraveling the puzzle of uneven and erratic growth. But that entails a still deeper puzzle. Why don't economies that have institutional frameworks that are inhospitable to economic growth simply adopt the frameworks of the successful economies? They do, or at least they try to: the rush to create market economies is a ubiquitous characteristic of third world and transition economies. But look at the results. They vary enormously, from China and the Czech republic, which so far are successful; to the republics of the ex Soviet Union, which so far show few signs of success; to sub saharan Africa, which remains a basket case. In our search for better analytical tools, therefore, we must be concerned not only with the fundamental structure of successful economies but also with "how to get there."

To make sense out of the historical and contemporary evidence, we must rethink the whole process of economic change. Current theory stems from the development of national income and growth accounting literature and explores the superficial aspects of economic growth—technology or human or physical capital. It ignores the structure of incentives and disincentives that make up the institutional framework of the economy, the polity, and the society (and our compass must include much more than purely economic variables). If we consider these incentives and why they vary, we are driven to examine the various belief systems that determine the institutional framework.

We are far from being able to understand the whole process of change but I can suggest some explanations which offer the promise of improving our understanding of where we have been. Specifically I shall support three arguments that are at wide variance with the received wisdom. The first is that contrary to both the economic history literature and the economic growth literature—old and new, the primary source of economic growth is the institutional/organizational structure that determines incentives. Until we focus on that subject we shall not advance knowledge on economic growth. Economies are poor when institutions are structured in such a way as to produce high costs of transacting in political and economic markets. Efficient economic and political markets once in place will then provide the context within which the new growth theory has relevance. The second is that it is necessary to create impersonal political and economic markets for sustained economic growth. Third, and central to the issues of this conference, is that the belief systems of societies and the way they evolve are the underlying determinant of institutions and their evolution. In the rest of this essay I shall support these arguments.

IV

Curiously enough, institutions are front and center in all current explanations of growth or lack of it in third world or transition economies; but the explanations lack both analytical content and an understanding of the nature of institutions or the way they evolve. The implication of standard economic analysis is that institutions can be created at will or that they are a dependent variable to getting the prices right. But recent experience provides convincing evidence that neither can they be taken for granted nor do they automatically evolve from getting the prices right. And historical experience makes clear that efficient economic institutions are the exception. To proceed we must understand what institutions are and how they evolve.

Institutions provide the structure that humans impose on human interaction in order to reduce uncertainty. There is nothing about that structure that implies that institutions are efficient in the sense of inducing economic growth. Sometimes they are created to facilitate exchange, encourage technological change, and induce human capital formation and in consequence reduce transaction and/or transformation costs; at other times they are created to support monopoly, prevent technological change, thwart human capital development, and generally raise the costs of transacting and/or transformation. In fact the inefficient has been the far more common pattern throughout history. To provide an understanding of why, I shall state six propositions that, I believe, underlie institutional change; but first let me dispel any confusion between institutions and organizations. Institutions are the rules of the game—both formal rules and informal constraints (conventions, norms of behavior and self-imposed codes of conduct)-- and their enforcement characteristics. Together they define the way the game is played. Organizations are the players. They are groups of individuals held together by some common objectives. Economic organizations are firms, trade unions, cooperatives, etc.; political organizations are political parties, legislatures, regulatory bodies; educational organizations are universities, schools, vocational training centers. The immediate objective of organizations may be profit maximizing (for firms) or improving reelection prospects (for political parties); but the ultimate objective is survival because all organizations live in a world of scarcity and hence competition.

Now to the six propositions:

1. The continuous interaction between institutions and organizations in the economic setting of scarcity and hence competitition is the key to institutional change.

2. Competition forces organizations continually to invest in new skills and knowledge to survive. The kind of skills and knowledge individuals and their organizations acquire will shape evolving perceptions about opportunities and hence choices that will incrementally alter institutions.

3. The institutional framework provides the incentive structure that dictates the kinds of skills and knowledge perceived to have the maximum payoff.

4 Perceptions are derived from the mental constructs of the players.

5. The economies of scope, complementarities, and network externalities of an institutional matrix make institutional change overwhelmingly incremental and path dependent.

6. Institutional change threatens existing order because it typically involves a conflict between the organizations (read interest groups) that were dominant in the old institutional order and those of the new institutional order.

Let me expand on propositions 2 through 6.

2. New or altered opportunities may be perceived to be a result of exogenous changes in the external environment that alter relative prices to organizations or a consequence of endogenous competition among the organizations of the polity and the economy. In either case the ubiquity of competition in the overall economic setting of scarcity induces entrepreneurs and the members of their organizations to invest in skills and knowledge. Whether through learning by doing on the job or the acquisition of formal knowledge, improving the efficiency of the organization relative to that of rivals is the key to survival.

While idle curiosity surely is an innate source of human beings' desire for knowledge, the rate of accumulating knowledge is clearly tied to the pay-offs. Secure monopolies, be they organizations in the polity or in the economy, simply do not have to improve to survive. But firms, political parties, or even institutions of higher learning faced with rival organizations must strive to improve their efficiency. When competition is muted (for whatever reasons) organizations will have less incentive to invest in new knowledge and in consequence will not induce rapid institutional change. Stable institutional structures will be the result. Vigorous organizational competition will accelerate the process of institutional change.

3. There is <u>no implication</u> in proposition 2 of evolutionary progress or economic growth—only of change. The institutional matrix defines the opportunity set, be it one that makes income redistribution the highest pay-off in an economy or one that provides the highest pay-offs to productive activity. While every economy provides a mixed set of incentives for both types of activity, the relative weights (as between redistributive and productive incentives) are crucial factors in the performance of economies. The organizations that come into existence will reflect the pay-off structure. More than that, the direction of their investment in skills and knowledge will equally reflect the underlying incentive structure. If the highest rate of return in an economy comes from piracy we can expect that the organizations will invest in skills and knowledge that will make them better pirates. Similarly if there are high returns to productive activities we will expect organizations to devote resources to investing in skill and knowledge that will increase productivity (the new growth economics literature can become relevant at this point).

The immediate investment by economic organizations in vocational and on the job training obviously will depend on the perceived benefits. But an even more fundamental influence on the future of the economy is the extent to which societies will invest in formal education, schooling, the dissemination of knowledge and both applied and pure research which will mirror the perceptions of the entrepreneurs in political and economic organizations.

4. The key to the choices that individuals make is their perceptions, which are a function of the way the mind interprets the information it receives. The mental constructs individuals form to explain and interpret the world around them are a result partly of the genetic evolution of the mind, partly of their cultural heritage, partly of the local everyday problems they confront and must solve, and partly of non-local learning.[7] The cultural heritage not only embodies learning from the experiences of past generations but carries over the values from past generations and the resultant perceptions are a blend of beliefs and preferences.

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[7]. This argument is elaborated in a cognitive science approach to the development of learning and belief systems in Denzau and North, "Shared Mental Models: Ideologies and Institutions", <u>Kyklos</u> (1994).

The mix among these sources in interpreting one's environment obviously varies as between for example a Papuan tribesman on the one hand and an economist in the United States on the other (although there is no implication that the latter's perceptions are independent of his or her cultural heritage).

The implication of the foregoing paragraph is that individuals from different backgrounds will interpret the same evidence differently; they may, in consequence, make different choices. If the information feedback of the consequences of choices were complete then individuals with the same utility function would gradually correct their perceptions and over time converge to a common equilibrium; but as Frank Hahn has succinctly put it, "There is a continuum of theories that agents can hold and act upon without ever encountering events which lead them to change their theories." (Hahn, 1987, p. 324) The result is that multiple equilibria are possible due to different choices by agents with identical tastes.

5. The viability, profitability, and indeed survival of the organizations of a society typically depend on the existing institutional matrix. That institutional structure has brought them into existence; and their complex web of interdependent contracts and other relationships has been constructed on it. Two implications follow. Institutional change is typically incremental and is path dependent.

Why can't economies reverse their direction overnight? This would surely be a puzzle in a world that operates as neo-classical theory would have us believe. That is, in a neo-classical world abrupt, radical change in institutions and organizations should immediately result from a radical change in relative prices or performance. Now it is true that on occasion accumulated pressures do produce an abrupt change in institutions akin to the punctuated equilibrium models in evolutionary theory. But it is simply a fact that the overwhelming majority of change is incremental and gradual. It is incremental because large scale change would harm large numbers of existing organizations and therefore is stoutly opposed by them..

Path dependence could mean nothing more than that yesterday's choices are the initial starting point for today's. But path dependence appears to be a much more fundamental determinant of long run change than that.[2] The difficulty of fundamentally altering paths is evident and suggests that the learning process by which we arrive at today's institutions constrains future choices. The institutional structure builds in a set of constraints with respect to downstream changes that biases choices.

[2]. The concept of path dependence was pioneered by Arthur (1989) and David (1985).

6. But nothing in the foregoing discussion conflicts with the point that institutional change is potentially destabilizing because it replaces old dominant organizations with new ones. Indeed the tension between order/disorder and institutional change is a fundamental influence on the process of economic/political change. Whether the institutional change is peaceful and orderly or leads to a breakdown in order is a central issue of societal evolution.

V

In the historical success stories of institutional adaptation, the belief system of the players filtered the information from current experiences and interpreted it in ways that induced choices that led to the modification, alteration, or adoption of institutions that resolved existing problems or led to improvements in competitive performance.

In early modern Europe[3] the lack of large scale political and economic order created the environment essential to political/economic development. In that competitive, decentralized environment lots of alternatives were pursued as each society confronted its own unique external environment. Some worked, as in the cases of the Netherlands and England; some failed, as in the cases of Spain and Portugal; and some, such as France, fell in between these two extremes. But the key to the story is the variety of options pursued and the likelihood (as compared to a single unified policy) that some would turn out to produce political/economic development. Even the relative failures in Western Europe played an essential role in European development and were more successful than other parts of the world because of competitive pressures.

The last point deserves special emphasis. It was the dynamic consequences of the competition among fragmented political bodies that resulted in an especially creative environment. Europe was politically fragmented; but it was integrated in having both an overall belief structure, derived from Christendom, and information and transportation connections that resulted in scientific, technological, and artistic developments in one part spreading rapidly throughout the others. To treat the Netherlands and England as success stories in isolation from the stimulus received from the rest of Europe (and to a lesser degree Islam and China) is to miss a vital part of the explanation. Italian city states, Portugal, and Germanic states all fell behind the Netherlands and England; but banking, artistic develoment, improvements in navigation, and printing were just a few of the obvious contributions that the former states made to European advancement.

Throughout Western Europe, competition among the evolving nation states was a deep underlying source of change and equally a constraint on the options available to them. Competition forced Crowns to trade rights and privileges—including protection of property rights—for revenue, including most fundamentally the granting to representative bodies—variously Parliament, States General, Cortes—control over tax rates and/or certain privileges in return for revenue. But it was the evolving bargaining strength of rulers vis-a-vis constituents that was the decisive feature of subsequent economic development. Three considerations were at stake: 1) the size of the potential gains the constituents could realize by the state taking over protection of the constituents' property; 2) the closeness of substitutes for the existing ruler—that is the ability of rivals (both within and outside the political unit) to the existing ruler to take over and provide the same, or more, services; 3) the structure of the economy which determined the benefits and costs to the ruler of various sources of revenue. Let me briefly describe the background conditions of the Netherlands and England that led to the external environments shaping their belief systems.

To understand the success of the Netherlands one must cast a backward glance at the evolution of the prosperous towns of the Low Countries such as Bruges, Ghent, and Liege; their internal conflicts; and their relationship to Burgundian and Habsburg rule. The prosperity of the towns, whether based on the wool cloth trade or metals trade, early on made for an urban-centered, market-oriented area unique at a time of overwhelmingly rural societies. Their internal conflicts reflected ongoing tensions between patrician and crafts and persistent conflicts over ongoing efforts to create local monopolies which, when successful, led to a drying up of the very sources of productivity which had been the mainspring of their growth. Burgundian (and later Habsburg) rule discouraged restrictive practices such as those that developed in the cloth towns of Bruges and Ghent; it also encouraged the growth of new centers of industry that sprang up in response to the favorable incentives embodied in the rules and property rights. In 1463 Philip the Good created a

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[3]. This section on the development of early modern Europe is elaborated at length in North, "The Paradox of the West"

representative body, the States General, which enacted laws and had the authority to vote taxes for the ruler. The tax revenue generated by their level of prosperity made the Low Countries the jewel in the Habsburg Empire.

England evolved along a route different from those of continental polities. As an island generally invulnerable to external conquest, it had no standing army. The exception was, of course, the Norman conquest, and here William succeeded in imposing a feudal structure that was more centralized than any on the Continent. The political institutions, in consequence, were exceptional in several respects. There was a single parliament for the entire country rather than regional estates as in France, Spain, and the Netherlands. There were also no divisions into towns, clergy, and nobility. But the more centralized feudal structure did not ensure that the Crown could not overstep the traditional liberties of the barons, as the Magna Carta attests.

We can now examine the evolving bargaining strength (and the three underlying determinants) of ruler versus constituent that shaped the belief structure and the path of each polity. In the Netherlands the productive town economies stood to gain substantially by the political order and protection of property rights provided by the Burgundians and then by Charles V. The structure of the economy built around export trades provided the means for easy-to-collect taxes on trade but not at a level to adversely affect the comparative advantage of those export trades. The liberty to come and go, to buy and sell, led to the evolution of efficient economic markets. But when Philip II altered the "contractual agreement" the Seven Provinces became convinced that they could prosper only with independence. The resistance was initiated by the States General which in 1581 issued the Act of Abjuration of allegiance to Philip II and claimed sovereignty for the Provinces themselves. The powers of the newly independent country resided with each province (which voted as a unit) and a unanimity rule meant that the States General could only act with the unanimous approval of the Seven Provinces. Cumbersome as that process was, this political structure survived. The polity not only evolved the elements of political representation and democratic decision rules but equally supported religious toleration. The belief structure that had evolved to shape the independent

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in Davis, ed (1995)

polity was more pragmatic than intellectual, a consequence of the incremental evolution of the bargaining strength of constituents and rulers.

As with the Netherlands, it was England's external trade that provided an increasing share of Crown revenue with taxes on wine, general merchandise, and wool cloth; but it was the wool export trade that was the backbone of the augmented revenue. Eileen Power's classic story of the wool trade (1941) describes the exchange between the three groups involved in that trade: the wool growers as represented in Parliament, the merchants of the staple, and the Crown. The merchants achieved a monopoly of the export trade and a depot in Calais; Parliament received the right to set the tax; and the Crown received the revenue. Stubbs (1896, 3:599) summarized the exchange as follows: "The admission of the right of parliament to legislate, to enquire into abuses, and to share in the guidance of national policy, was practically purchased by the money granted to Edward I and Edward III."

With the Tudors the English Crown was at the zenith of its power, but it never achieved the unilateral control over taxing power that the Crowns of France and Spain achieved. The confiscation of monastery lands and possessions by Henry VIII alienated many peers and much of the clergy and as a consequence "Henry had need of the House of Commons and he cultivated it with sedulous care" (Elton, 1953, 4). The Stuarts inherited what the Tudors had sown and the evolving controversy between the Crown and Parliament is a well known tale. Two aspects of this controversy are noteworthy for this analysis. One was the evolving perception of the common law as the supreme law of the land—a position notably championed by Sir Edward Coke—and the other was the connection made between monopoly and a denial of liberty as embodied in the Crown grants of monopoly privileges.

VI

England and the Netherlands represent historical success stories in which evolving belief systems shaped by external events induced institutional evolution to provide the beginning of modern economic growth. Key institutional/organizational changes were those that permitted the growth of impersonal exchange—both economic and political. By permitted I mean that, to use game theory terminology, they altered the payoff between defection and cooperation to favor the latter in both political and economic markets. That is, personal exchange provides settings in which it typically pays to cooperate. Impersonal exchange is just the antithesis and necessitates the development of institutions to alter payoffs in favor of cooperative activity.

In the case of economic markets recent historical research has provided analytical accounts of the evolution of the institutions that undergirded long distance trade in the Middle Ages (Greif,1993); that led to the development of merchant codes of conduct that became the foundation of commercial law (Milgrom, North, and Weingast, 1990); that converted uncertainty to risk, leading to the development of marine insurance (deRoover, 1945); and that provided the foundation of an impersonal capital market with the development of the bill of exchange and the growth of early banking organization. By the end of the sixteenth century these and other institutional/organizational innovations had created the first modern economy in Amsterdam and the Seven Provinces that formed the Netherlands.[4]

But the creation of efficient economic markets is only half, and the less puzzling half, of the story. It is much more difficult to account for and explain the growth of "efficient" political markets that are a necessary precondition to the development of efficient economic institutions. It is the polity that specifies and enforces the economic rules of the game, and our knowledge of the essential conditions for the creation of such political institutions has not progressed much beyond the insightful observations of James Madison in the Federalist Papers.

However, the historical evidence cited above provides essential clues to the evolutionary process in early modern Europe. A growing need for revenue in the face of the rising costs of warfare forced monarchs to create "representative bodies"—Parliament, Estates General, Cortes—and cede them certain rights in return for revenue. But at this point the stories diverge between the Netherlands and England on the one hand and much of the rest of Europe on the other. In the former the three considerations cited in Section V led to the growth of representative government; in the latter they led to the persistence or revival of absolutist regimes with centralized decision making over the economy.

The contrasting subsequent history of the New World bears striking testimony to the significance of path dependence. In the case of North America, the English colonies were formed in the century when the struggle between Parliament and the Crown was coming to a head. Religious and political diversity in the mother country was paralleled in the colonies. The general development in the direction of local political control and the growth of assemblies was unambiguous. Similarly the colonies carried over free and common socage tenure of land (fee simple ownership rights) and secure property rights in other factor and product markets. Independence did not cause a fundamental change in the dominant organizations and therefore was accomplished with a minimum of disorder.

The Spanish Indies conquest came at the precise time that the influence of the Castilian Cortes was declining and the monarchy of Castile, which was the seat of power in Spain, was firmly establishing centralized bureaucratic control over Spain and the Spanish Indies. The conquerors imposed a uniform religion and bureaucratic administration on already existing agricultural societies. When revolution led to colonial independence from Spain in the early nineteenth century wealth maximizing behavior by organizations and their entrepreneurs (political and economic) entailed getting control of, or influence over, the bureaucratic machinery; a struggle for power was the inevitable result. The result was ongoing internal disorder which plagued Latin America throughout much of the nineteenth century as conflicting interest groups struggled for supremacy. One cannot make sense out of the contrasting subsequent history of the Americas north and south of the Rio Grande river without taking into account this historical background.[5]

VII

Whatever lessons there are from history come from the fundamentals of human interaction over time. Let me draw some specific implications from the previous two sections that can form an agenda for future research as well as a backdrop for this conference.

We can deal briefly with economies that have failed to develop. These are cases in which the belief system, reflecting the historical experiences of that economy, fails to overcame the critical hurdle—the creation of institutions, economic and political, that will permit impersonal exchange. Markets remain

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4. See North (1991) and Greif (1993) for a summary of the game theoretic and other analytical literature.
5. The downstream consequences in the New World are discussed in more detail in North (1990), chapter 12. Robert Putnam tells a similar story of the contrasting development of different regions in Italy from the 12th century onward in Putnam (1993).

local and/or poorly developed. As these economies became exposed to the larger world economy the institutional matrix typically spawns the development of organizations whose profitable opportunities predominantly favor redistributive activities.[6] Political organizations in such cases will appear similar to those of the classic Virginia school of political economy, in which the state is little more than a theft machine. We do not have to look very far to see instances of such polities in Africa or, with some modification, in Latin America.

The obverse, the success stories, have been briefly described in the outlines above of the Netherlands and England, where external experiences reinforced evolving belief systems in the direction of productive activities by the economic organizations. Political organizations in these cases have evolved strong informal constraints—norms of behavior—that have constrained the behavior of the political actors. This point deserves special emphasis. The gradual development of informal norms of behavior that become deeply imbedded in the society provides the stable underpinning to the adaptive efficiency characterizing the western economies with a long history of growth. Adaptive efficiency refers to a process of institutional change that occurs with changes in the dominant organizations and still maintains order and stability.

This last point can serve as an opening wedge to explore some fundamentals of human interaction. What underlies the formation and evolution of institutions? It is the ubiquitous human drive to reduce uncertainty—to create order from disorder—that leads humans to scaffold both the mental models they possess—ie belief systems—and the external environment—ie institutions. But the very structure of the scaffolding is the key to whether this process of change can be orderly and in the case of economic growth can produce productivity growth as well.

Part of the scaffolding is an evolutionary consequence of successful mutations and is therefore a part of the genetic architecture of humans; part is a consequence of cultural evolution. Just what the mix is between the genetic archtecture and the cultural heritage is in dispute. Evolutionary pschologists have

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[6]. The second economic revolution, the wedding of science to technology which began in the last half of the nineteenth century, is the source of modern economic growth and entails enormous specialization, division of labor, urban societies and global markets. The organizational restructuring--economic, political, and social--necessary to capture the gains from trade with this technology has necessitated fundamental changes in societies. The institutional

stressed the genetic architecture in the scaffolding process at the expense of the role of the cultural heritiage.[7] Others such as Stephen J. Gould have suggested that there is a lot of slack in the genetic architecture, which gives greater scope to cultural evolution. Certainly many of our personal preferences—hunger, thirst, sex, and perhaps some of our beliefs—are genetically determined; but some preferences and most beliefs surely must be acquired.

Ken Binmore maintains that our genes probably do not insist that we prefer or believe certain things but that they do organize our cognitive processes in terms of preferences and beliefs. He maintains that we come equipped with algorithms that not only interpret the behavioral patterns we observe in ourselves and others in terms of preference-belief systems but actively build such models into our own operating systems. The evolutionary advantage of such an inductive process is that new behaviors are tested against past experience in our internal laboratory. Humans enjoy the benefits of having the potential to learn a second best strategy in any game. Interactive learning is a two-stage affair in which we first receive a social signal that tells us how to behave and then test the behavior against our preferences to see whether we wish to follow its recommendation.[8]

An issue then is the extent to which the "mind is adapted" by several million years of genetic encoding versus cultural evolution; another, obviously related issue is just how the mind works. Both are central to answering the questions posed at the beginning of this essay and we are far from settling them in either evolutionary psychology or cognitive science. Therefore what follows is tentative—more the intuitions of an economist in reading in both of these fields than any settled conclusions.

It is easier to be convinced of the genetic aptitude of human beings for language—a subject in which there is a lot of interesting research—than to be similarly convinced of the genetic aptitude for cooperation. No, that is too strong. There is evidence of the innate drive for cooperation. Recent research in experimental economics has reinforced the findings of evolutionary psychologists that human beings are preprogrammed to achieve cooperative outcomes in social exchange environments. Cooperation increases

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adjustments are difficult enough for developed economies and much more difficult for transition and third world economies. See North (1981) chapter 13 for further discussion.

[7] The Adapted Mind, Barkow, Cosmides, and Tooby, eds. Oxford: The University Press, 1992 is an excellent statement of this perspective.

with communication, observability, opportunities to punish cheaters even at one's own expense, and the ability to signal intentions without direct communication. In a recent paper by Elizabeth Hoffman, Kevin McCabe, and Vernon Smith summarizing a large number of experimental game results they report:

> " ...people invoke reward/punishment strategies in a wide variety of small group interactive contexts. These strategies are generally inconsistent with, but more profitable than, the noncooperative strategies predicted by game theory. There is, however, consistency with the game theoretic folk theorem which asserts that repetition favors cooperation, although we observe a substantial use of reward/punishment strategies and somne achievement of cooperative outcomes even in single play games.
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> Non Cooperative outcomes are favored, however, where it is very costly to coordinate a cooperative outcome, in larger groups, and even in smaller groups under private information. In large groups interacting through markets using property rights and a medium of exchange, and with dispersed private information, non cooperative interaction supports the achievement of socially desirable outcomes. Experimental studies have long supported this fundamental theorem of markets. This therem does not generally fail, however, in small group interactions because people modify their strict self-interest behavior, using reward/punishment strategies that enable some approximation of surplus maximizing outcomes. Seen in the light of evolutionary psychology, such behavior is not a puzzle, but a natural product of our mental evolution and social adaptation"[9]

But the immense variation in the forms it takes and its varying degrees of success make the cultural component of cooperative behavior an important part of the story. The problems of impersonal exchange suggest that whatever drives exist for innate cooperation must be supplemented by cultural factors in successful impersonal political and economic markets. Creating cooperative frameworks of economic and political impersonal exchange are at the heart of solving problems of societal, political, and economic

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[8] Ken Binmore Game Theory and the Social Contract II , Chapter 2 Evolution in Eden, Draft Ms.

[9] This research is summarized in a working paper entitled "Behavioral Foundations of Reciprocity: Experimental Economics and Evolutionary Psychology" by Elizabeth Hoffman, Kevin McCabe, and Vernon Smith, University of Arzona, June 1995

performance.[10] While formal rules can help in creating such frameworks it is the informal constraints embodied in norms of behavior, conventions, and internally imposed codes of conduct that are critical.

How does the mind work? It is easy to be impressed by the immense strides of cognitive science in recent years. It is also clear that there is immense disagreement among cognitive scientists.[11] Is connectionism a promising research agenda? Is there a commonsense problem? Can we explain consciousness? On a far more mundane level but one we can build on, what is the relationship between rationality and intelligence and is rationality deductive in nature, proceeding from the general to the specific? We are concerned to understand the way in which humans develop the fundamental equipment to put knowledge to work. "On the one hand, there is a large body of research that documents striking failures of naive humans when confronting relatively simple tasks in probability theory, decision making, and elementary logic. On the other hand, there is the continuing belief of psychologists and computer scientists that by understanding human problem solving performance we will be better able to build machines that are truly intelligent."[12] The most promising approach to improving our understanding of how the mind works is one that suggests humans have a quite different kind of intelligence than is implied by the rationality postulate and its deductive corollary. Indeed the pattern-based reasoning of connectionist models is congenial to my understanding of the way belief systems evolve.

Here is the way a leading study on cognition characterizes the inductive process by which rule-based mental models are formed and revised in an ongoing process:"The (cognitive) system is continually engaged in pursuing its goals, in the course of which problem elements are constantly being recategorized and predictions are constantly being generated. As part of this process, various triggering conditions initiate inductive changes in the systems rules. Unexpected outcomes provide problems that the system solves by creating new rules as hypotheses. Concepts with shared properties are activated, thus providing analogies for use in problem solving and rule generation....The major task of the system may be described as reducing uncertainty about the environment" (Holland et al, 1986, p69).

[10] See North, 1990, chapter 2 for a discussion of the problems of cooperation in impersonal exchange.
[11] See Speaking Minds: Interviews with Twenty Eminent Cognitive Scientists, Baumgartner and Payr eds. Princeton Press 1995.
[12] Lola Lopes and Gregg C. Oden, "The Rationality of Intelligence" in Probability and Rationality, E. Eells and T. Murazewski, eds. Amsterdam: Rodopi, 1991, p 200.

VIII

This essay is little more than an agenda for research but fortunately one that is the focus of the papers at this conference. How do we achieve economic growth, order, and a creative and democratic society. The issues go far beyond the customary agenda of economists and entail the cooperative interaction of social scientists in the elusive pursuit of understanding the process of societal change. That is a big enough challenge for all of us.