

**SUPPLEMENT**  
**M<sub>s</sub>ASI - HF LLC Spring 2012 Newsletter**

**Influencing Outcomes in Housing Policy<sup>1</sup>**

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**Introduction**

Influencing outcomes in housing policy, as with other activities involving complex adaptive systems, is constrained by the proportionality of the system and the capability of the participants. Both the proportionality of the system and the capability of the participants may evolve over time so that there may be an increase in the ability to influence outcomes.

In the case of housing policy, the concern obviously includes branches of the federal government; but, it includes the household decision makers and all the organizations in the network that link the governmental authorities and the households.

Comprehension of the concepts involved in increasing the ability to influence outcomes is not an easy matter. Grasping the concepts may require the reader to adopt a different perspective, and that may not be within the capability of some readers. However, some people with the cerebral flexibility may by adopting the different perspective increase their ability to influence outcomes.

It will help to become familiar with the vocabulary of some nascent disciplines. Several key concepts are represented by the following words and phrases; linearity (and nonlinearity), complexity theory, complex adaptive systems, emergence, networks, and nodes or agents, energy and information, memes, and sociocultural evolution. Brief explanations are sometimes provided as the terms are introduced in the discussion, and the web version has endnotes and links to elaborate. The intent is to make the line of reasoning as brief as feasible so that the reader will get the gist of the idea. Applications are discussed elsewhere.

**Proportionality of the System**

Proportionality of the system refers to the degree of nonlinearity in the system. Although the degree of nonlinearity is a continuum, there are three categories of systems with substantial differences in proportionality. They may be termed mechanical, biological, and sociological.

**Mechanical systems.** Mechanical systems in the context of physics as a discipline are linear in that the system of elements that interact do so on mechanical principles in which the outcomes are proportional as related to the inputs of forces. The laws of thermodynamics are based on linear relationships as are the actions of billiard balls. There is a proportionality of the outputs to the inputs. Energy will be lost in heat transfer as well as in the friction of the ball rolling on the felt surface, but although the ratios of lost energy may vary with circumstances, as golfers will ready testify depending on the lie of the ball and the wind, there is a great degree of accuracy in predictability of the path of the ball given the full information.

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<sup>1</sup>This essay was prepared as the basis for a presentation at the Seminar for Strategic Decision-Making, this year focusing on Some Applications of Complexity Theory in Our Changing World. The seminar, in its ninth year at ASPEC (Academy of Senior Professionals at Eckerd College), has presentations ranging from personalized medicine to societal issues with substantial emphasis on organizational issues. The presenters, all with doctorates, come from diverse fields including physics, chemistry, psychology, medicine, a hybrid of education & management, information technology, and business administration; that last one focused on interdisciplinary applications to real estate. An electronic version on the HoytWiki site (on [http://wiki.hoyt.org/wiki/Discipline\\_Development](http://wiki.hoyt.org/wiki/Discipline_Development)) has endnotes and links to additional material. The material draws heavily from work done by its author related to the Homer Hoyt Institute's Subprime Crisis Research Program, started in 2007, now known as the HHI Research Initiative. **All rights reserved by the author.**

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The great accuracy of predictability is achievable because the knowledge acquired of relationships within the system has in large measure been obtained through experimental methodology in which hypotheses about relationships have been tested and some unwarranted assumptions have been rejected as false. Although warranted assumptions in nonlinear systems cannot be proven correct by deductive methods, warranted assumptions internal to abstract linear systems such as some dealt with by mathematics (geometric proofs as a great example) may be proven correct by logic. For nonlinear systems, unwarranted assumptions may be rejected by use of the inductive method, adding to the strength of belief in the accuracy of the assessment of the relationships. This falsification approach is the standard of the physical sciences and is the basis of most research contributing to the understanding of systems by adding bits of knowledge at the edge.

Paradigm shifts such as Einstein's theory of relativity in discussing space and time are a step in linking the proportionality of mechanical systems to biological systems. The classic example of time and space relationships of walking on a moving train relative to the train station make little practical difference at that scale, but substantial difference at the scale of the universe when trying to understand the solar system.

**Biological systems.** Biological systems such as the human anatomy are nonlinear in that they are complex adaptive systems. The nonlinearity arises because there is emergent behavior arising from one layer of a network to the next layer of a network, as from DNA to, cells, to tissues, to organs. The emergent behavior from the micro layer to the macro layer produces properties (characteristics) at the macro layer not present at the micro layer. This arises because of the interaction of the nodes (agents) in the network. That interaction may produce an adaptation to changed conditions, and those conditions do change as the body grows through stages and evolves from generation to generation.

Since the pace of change in the biological system may be relatively slow, the relationships within the networks as to the energy and information transmission among nodes (agents) retain enough proportionality to predict outcomes. It is the change in relationships attributable to adaptive behavior that erodes the accuracy of predictions of outcomes.

When the focus is on a small part of the system such as a cell, a tissue, or an organ, the laboratory methodologies utilizing experimental methodology may enhance the accuracy in the prediction of outcomes. When the focus is on the operation of the system as a whole, the body, the predictions become less reliable because of the interactions within and among the various layers of networks. Of particular concern are the unknown and unwanted side effects.

The health of the system requires some semblance of balance. Within some limits, the body can self-correct from imbalances imposed on it. When self-correction fails, intervention may be warranted to compensate for the shortfall. Preventive actions may be taken to avert the necessity of intervention. Even better, choices may be made as to allow the self-corrective capabilities of the complex adaptive system to make the adjustments necessary to meet the changed conditions as the body moves through its stages of growth and decline.

The evolutionary process over generations of nature and nurture alter the sets of relationships among the nodes in the networks ranging from the DNA that is inherited to the memes acquired in the culture to which the individual is exposed. The concept of memes is that of cultural ideas and beliefs that may be communicated among individuals in the same societies or between individuals in different societies.

**Sociological systems.** Sociological systems exist at the scale of civilizations and at the scale of societal structures that have evolved even to lesser stages of development. All sociological systems are complex adaptive systems, but the proportionality may vary quite widely because the DNA and the memes may vary quite widely.

Sociological systems are self-organizing systems although hierarchical structures may be imposed or internally generated. The behavior of the agents (nodes) may change with the changed environment, but there are limitations in the capability of the participants.

Predictability of outcomes in sociological systems is even more problematic than in biological systems. This is attributable to a wider range of decision choices of agents (nodes) among individuals in some sociological systems. The genes in the biological systems undergo the evolutionary process of variation, interaction, and selection within the constraints of the genes capability to make choices. The constraints to make choices by individuals in a sociological system may vary widely. The memes in some societies are so restrictive that the predictability of outcomes is quite high relative to the predictability in free societies with a great deal of diversity.

Free societies with a great deal of diversity facilitate individuals exploring variations and making selections which may be relatively predictable given sufficient information about the individual. The selections however, may alter the environment in which others make decisions, and the others in the network may adapt. That is what makes it a complex adaptive system. Sometimes the complex adaptive system operates with a range of self-adjustment to rebalance after internal or external forces disrupt the system; sometimes discontinuities result.

The socio-cultural evolution of Western civilization has produced some powerful analytical systems for enhancing knowledge. The great watershed was the Scientific Revolution. A new watershed may emerge from contemporary crises being dealt with by application of knowledge made possible through nascent disciplines.

The research methodologies of physics are structured to deal with linear systems. The research methodologies of the biological sciences, while building on the linear methodologies rely on methodologies that can deal with evolutionary phenomenon and the inherent complex adaptive systems. Research methodologies for sociological systems draw heavily on those of the physical and biological sciences, but need an evolution of methodologies to further enhance the body of knowledge and ability to influence outcomes.

Influencing outcomes, when reasoned, relies to some extent on the predictability of the inputs and the proportionality of the outputs to the inputs. ***The concern here is with enhancing the capability of the participants and recognizing the limitations.***

### **Capability of Participants or Societies**

**Entomological examples.** Entomological examples of capability limitations include ants and bees.

The ants are included because studies show that they operate in their self-organized system reacting to signals that are contradictory to other overwhelming evidence. Bees are included because they, in pursuing their own self-interest generate an emergent property that is of value to the preservation of the hive; but their capability is limited.

Steven Johnson in his book *Emergence: The Connected Lives of Ants, Brains, Cities, and Software* explains emergence in a variety of societal systems. In the case of ant colonies his explanation develops the following ideas. The ant queen is not the head of a hierarchical structure, but is simply the protected ant because she lays the eggs for the ant colony. When danger strikes, she is sequestered deep in the ground. The ants are directed by genetics, not hierarchical instructions. The ants communicate by leaving trails and emitting odors. This organization of the society, the colony, is self-organized in that it an emergent phenomenon.

Emergence, as a phenomenon, links two different levels of activity; for example, the individual decisions of the agents (nodes in a system) and the resulting spatial patterns. In the case of the ant colony consider the following: Ants, shortly after dying emit an odor. That odor is a signal to the live ants to carry the dead ant to a location in the colony as far from the cluster of ant activity as possible. The signal is read biologically communicating the instruction to bring the dead ant to the location of the cemetery. The ants also have a dump for discarded remnants of food. It is at another distant area. This spatial pattern emerges from the bottom-up; it is not directed by a central planning authority.

In research experiments after the Johnson book, the response of ants to fake odors sending the death message, live ants were carried to the cemetery. It appears that the ants do not have the capability to reason that the signals may be fake.

The discussion of bees starts with a poem, by Mandeville, a physician with literary talent. The poem may have been written as a political satire making the point in which he "...describes a thriving bee community until many of the bees decide to seek honesty and virtue. Without their desire for personal gain the colony loses the hive, thus concluding that without private vices there exists no public benefit." [Wikipedia.] The poem did not reflect an understanding of the biological basis of the behavior of bees. Biologically, bees have a genetic diversity in which "...[the] individual bee's [body] temperature for huddling and fanning are tied to a genetically linked trait. There is a genetic diversity so that while the hive needs to maintain a temperature in a fairly narrow range, the bees by seeking their own comfort fan their wings and cluster responding to their different comfort zones."

The bees have a self-organizing system driven by genetics. In the case of ants, there is also a self-organizing system for the colony. But while the genetics are critical in that they direct the ants, so is the communication system. The ants communicate by leaving trails and emitting odors; and as discussed, their choices are not reason based. The bees, when the hive gets overcrowded, have some exploratory ventures of some bees, who return to bring others to see some potential new sites. Those bees wishing to relocate, do so, and a new hive is formed.

The use of the *invisible hand* metaphor by Smith in *The Theory of Moral Sentiments* appears as follows: "They are led by an invisible hand to make nearly the same distribution of the necessities of life which would have been made had the earth been divided into equal portions among all its inhabitants; and thus, without intending it, without knowing it, advance the interest of society, and afford means to the multiplication of the species." [page 182.] The behavior of the bees is an *emergent phenomenon*. It occurs in complex systems in which the agents (bees) in the system adapt.

Understanding the metaphor is required if it is to be effectively applied. The bees can take care of the hive only within their capability. Weather much too hot, or much to cool, to be controlled by their pursuing their self-interest calls for something beyond the emergent capability of the invisible hand.

**Historical sociological examples from the Middle Ages.** Historical examples of what appears to be capacity limitations of societal structures in the Middle Ages includes (1) Islam after the reign of the Mu'tazilites and (2) Christian Europe in the era of the Scholastics.

Aristotle's writings were lost for centuries but surfaced in Islam in the ninth century of the Common Era. A leading Islamic philosopher, Avicenna, and a century later, Averroes, grappled with the reconciliation of Aristotelian philosophy and the sacred text of Islam. About the same time as Averroes was studying Aristotle so was Rabbi Moses Maimonides, the Jewish philosopher. Maimonides was able to recognize the logic of Aristotle and on some interpretations of sacred Jewish texts defer to philosophical logic. Thomas Aquinas, a little later studied Aristotle focusing on Aristotelian logic. This was a significant route of Aristotelian logic to Western Europe. Presumably, the Aristotelian influence contributed significantly to the evolution of the West.

Islam was the world leader in its Golden Era, its first 500 years, during the middle of which the Aristotelian writings were discovered by Islam. According to Gregorian Vartan, in his book (*Islam: A Mosaic, Not a Monolith*, page 16), for several decades Mu'tazilite scholars "...used rational proofs for God and the universe, as they sought to harmonize reason with Muslim scripture..." But, some of the religious authorities and public rejected it and the attempts of the Mu'tazilites to force their beliefs led in part to their loss of power. That loss of power left a societal structure with a more limited capability for the use of reason.

The rejection of reason by man, when in conflict with faith based on scripture, may well have been the most significant impediment to the continuation of the Golden Age of Islam. According to Karen Armstrong (in her book *A History of God*, page 161) that rejection of reason may be based on the belief that God could not enjoin anything contrary to reason, so that the Koran superseded the reason by man. By way of contrast, Western civilization reached a turning point with the rejection of rule by royalty and religion in favor of reason; that was the Enlightenment centered in the eighteenth century in predominantly Christian Western Europe. In a sense, this is all about justice.

**The Scientific Revolution and the Enlightenment.** The Scientific Revolution and the Enlightenment (also known as the Age of Reason) provided a dramatic shift in the capability of the society to influence outcomes. The Scientific Revolution made a difference because it improved the predictability of outcomes. The Enlightenment changed the societal structure with an empowerment of the people that enabled them through democratic institutions to influence outcomes.

The Enlightenment might have been centuries earlier but for the obscurantism of the Scholastics. The Scholastics of the Middle Ages were the scholars that used reason within the bounds of the rules and assumptions of their thought; but, they refused to speculate beyond their practical reasoning. That limited their capacity. That limitation prevailed among scientists as well as religious scholars in that era, but when the Scientific Revolution broke the pattern it made way for an increased capability in the sociological arena.

### **Enhancing Capacity to Influence Outcomes**

Understanding network science is helpful in influencing outcomes. Even partial understanding as with the use of social networks can make a big difference. Political revolt organized through contacts on social networks is a case in point. Additionally, the hybrid situation of the organization of a football team with a hierarchical structure in which the game plays are directed from the top down, and each player has his specific role but has a range of choice during the play, is a case in point in which reliance on specific team members makes the difference. There is an old story about a quarterback who developed an arrogance that annoyed his team members and they decided not to block up to standard. When the quarterback complained they suggested that he show the opposition his newspaper clippings.

Understanding the applications of complexity theory is enhanced by understanding an integration of disciplines. That point was well made by the way the NASA research was organized by placing different disciplines in teams so that the outputs were interdisciplinary through a joint effort of production.

The organizational structures of a society undergoing a transformation of a sociocultural evolution that can more effectively deal with the evolution of economies, especially markets, and the simultaneous evolution of political networks would have enhanced capability to influence outcomes. This applies to developed economies as well as economies at earlier stages of political and economic development. It also applies to subcultures in advanced societies as well as cultures in nations whose institutional arrangements are somewhat dated. However, obscurantism is retarding progress.

**Some foundational attributes of organizations and societies that have flourished.** One size does not fit all, nor should it if one expects to see a system evolve. The evolution process requires variety, interaction, and selection. The variety concept is a diversity of agents or nodes; that is people and organizations in the case at hand. That diversity accompanied by interaction conveys information that facilitates adjustments of decisions, including adopting new memes, that amounts to selections. Those selections are more likely to be the ones that thrive. It happens at the level of business and other organizations within an economy and it happens at the level of political-economies.

The attributes that appear to be associated with the flourishing of societies at the scale ranging from organizations to nations start with a dynamic balance in the system. Dynamic balance refers to the ability of the system to self-correct as environmental forces act upon the system. The principles may be viewed from the perspective of the operation of subsystems.

Interaction among nodes of the subsystem to produce an emergence of balance in the system requires coordination through information and energy. These subsystems of a complex adaptive system have a learning process that arises from experience, but may be modified according to the extent of reason and varied by the interpretation given the perspective. In the case of the human body, the learning process is muscular as directed by the nervous system controlled in the brain and operation with the energy of the flow of blood.

In the case of a subsystem of society as occurs with markets the learning may occur at the subsystem level with buyers, sellers, and others, adjusting as conditions change. Governmental authority may impose rules on the behavior of nodes (agents – the humans and organizations that operate in the market) and may also be a player in the market.

For the human body, the learning process of the muscles varies among individuals and results in various speeds of response and extent of response. **The principle is that responses that are too slow and/or are too great or too little can cause a fall resulting in an injury to the body, not necessarily limited to those muscles that were inadequate for maintaining balance.**

For a market, such as that of housing finance, the learning process is that of the agents (nodes) in the network (that include borrowers, lenders and others involved in the transactions) and that of the regulators that impose rules on the system. In the case of the housing market, the bubble hurt many homeowners who were not buyers or borrowers in the rise that led to the burst of the bubble. Similarly, the freeze in the capital market, while hurting those directly involved also hurt innocent others.

The relevance for markets is that the learning process and the operation of the system require one or more sensory systems to detect forces that impact the balance. This applies to borrowers, lenders and others involved in the loan origination process and to those in the chain of the flow of funds from the capital markets to the housing sector. It also involves the governmental authorities that determine monetary and fiscal policy and that operate to regulate institutions and other participants in the market process. This is discussed in The Homer Hoyt Institute Research Initiative for Developing Data and Analytics and is available on the web.

For the human body, the sensory system may be initiated by the extent of pressure, temperature, or pain in some form. The information from those and other sensory nodes in the system is conveyed to the brain where it is processed in another complex adaptive system so as to select information for use or discard, rightly or wrongly (extent to which reason has been developed and perspective influences selection). The capability of the system varies with the extent to which it has been developed. Exercise that develops the muscles increases the response through the nervous system and the flow of blood providing the energy to adjust the system in responding to the external forces. The result is a better ability to retain balance in the face of increased levels of potentially destabilizing external forces.

**The principle is that the learning impacts capability and that learning requires information inputs and processing of the information (which may vary with selection of information for processing, use of reason in the process, and the mental models {schema} developed in the mind).**

For a market such as that of housing finance, the sensory process is built upon what the participants have learned to pick up on as information for processing; that obviously includes prices, but also includes activity; most importantly for the regulators, it includes the flow of funds as a counterpart to the flow of blood. It is comparable to feeling the extent of pressure, temperature, or pain. Again, comparable to the human body, the processing system of the mind in its selection of information and schema, especially the paths through which reason is used, determines the response. The potential responses are limited by the capability. That capability in the case of housing policy and monetary and fiscal policy fell short of that necessary to maintain some semblance of balance in the system.

The capability of the system to self-correct is limited. It may grow, as discussed with learning, but it needs the freedom to develop and utilize its natural dynamic capabilities. In the case of the human body, movement and posture may enhance the natural dynamic capabilities. For movement, there are three types of commonly used movements that contribute to enhance the dynamic balance of the system, the ability to self-correct adequately enough to avoid a fall. These are (1) developing muscular strength in ankle movements so as to be able to sense and respond, (2) similar developments in hip movements, and (3) the size and speed of stepping movement, larger and faster.

For posture, the key is the development of posture that puts the center of gravity under the least stress on the system. Poor posture puts excessive stress on the system and makes it inefficient in self-correcting capability. The trade-off is that it takes energy to build up the self-corrective ability. The trade-off is well worthwhile because the unwanted side effects of the poor posture along with the direct benefits of what good posture produces. Among the exercises with excellent output-input ratios are ankle pumps, abdominal exercises, hip exercises, and a variety of other sitting exercises.

**The principle is that the nodes in the network micro to the level of the system that controls balance can through development of capability enhance balance; and the structure of the system can facilitate the self-corrective ability for balance.**

In the case of a market, such as that of housing finance, the movement is in the activity of the agents (nodes) in the system, and the structure is in the prevailing societal mores and the regulatory system. As to mores, some variables in the system include the following: (1) Honesty, the intended consequences of the activity are affected by the degree to which the participants observe standards of truth in representations and disclosure, and the extent to which justice is meted out to enforce the rules of society; (2) The character of the playing field, such that transparency, referring to the absence of opaqueness that impairs an equality of power in a competitive market; (3) Adequate performance of various agents in the system from brokers and evaluators to regulators.

As to structure, a self-correcting system needs the following: (1) A competitive structure that has enough diversity to permit failure (avoid structures containing the too big to fail), and (2) Accountability in the system that exerts force to rebalance. That accountability is within the business and other organizations participating in the market and especially in the regulatory authority. In short, the system requires justice, liberty, and some semblance of equity.

In summary, three principles have been postulated: (1) The first principle is that responses that are too slow and/or are too great or too little can cause a loss of balance resulting in substantial damage; (2) The second principle is that the learning impacts capability and that learning requires information inputs and processing of the information (which may vary with selection of information for processing, use of reason in the process, and the mental models {schema} developed in the mind); and (3) The third principle is that the nodes in the network micro to the level of the system that controls balance can through development of capability enhance balance; and the structure of the system can facilitate the self-corrective ability for balance.

The message is that complex adaptive systems have, within limits, an ability to self-correct. That ability to self-correct may be viewed as capability dependent on the proportionality of the system (degree of nonlinearity of the system). The capability can be enhanced through learning by the agents within the system and by altering the structure of the system.

In the case of the housing bubble, federal policy intervening too much to foster home ownership was a case of too much contributing to a fall; and, the corrective efforts, when the capital markets froze, were too little too late to restore sufficient balance quickly enough to avoid the Great Recession.

Similarly, the participants within the system, ranging from the borrowers to the lenders and investors, and all those in between, put their organizations in danger. They failed to have an adequate understanding of dynamic balance in an evolving system.

**Fostering the emergence of a New Age of Enlightenment.** Fostering the emergence of a *New Age of Enlightenment* is a little bit like the race against the *Red Queen*; one has to run just to stay in the same relative place. The globalization has vastly increased the nodes in the networks of the political-economies the sociocultural evolution faces an ever increasing challenge.

In order to engage the challenge and to avert the seemingly accelerating pace of discontinuities in economic and political evolutions with horrendous outcomes, it makes sense to increase an understanding of harnessing complexity. That requires enhancing the capability of individuals as well as the society as a whole. That capability is dependent on altering the memes within the subcultures and the memes of organizations as well as a substantial evolution of organizations.

This process involves changes in human nature, and human natures do change, but the process is slow. The race against the Red Queen may be lost more than once before a New Age of Enlightenment emerges. However, a valiant effort may be made.

The evolution of the world economy is increasing the nonlinearity of the system; the approach to deal with that is similar to the same approach as discussed in dealing with enhancing balance in the system of housing finance. It is based on the current stage of sociocultural evolution except that it is recommending applications from nascent disciplines.

The focus here is on the next advances in Western Civilization. The main thrust of the discussions on the Hoyt Wiki site is relevant to discipline development, particularly the development and dissemination of knowledge through research. ***The main thrust of this discussion of influencing outcomes is changing the way people look at things.*** An item of exceptional importance is on the HoytWiki site under Discipline Development. It is titled "A Gift for Our Leading Social Scientists."

The process for influencing outcomes is heavily dependent on education, especially understanding the system. Furthermore it includes understanding that the system is changing and that others see the system differently. It took Western Civilization a long time to get to Emanuel Kant's perspective that while our knowledge starts with experience it requires reason and differs according to perspectives of the viewer. It then took some time to get to Isaiah Berlin's view that pluralism works a lot better for society than a singular set of values for all civilization. Such changes come slowly, but may be best approached by dealing with some commonalities in values although the perspectives of the values differ. The discussion here focused on only a few values, liberty, justice and truth. This leads to a discussion of visions and reality; that is a work in progress.