

THE NONDESIGNABILITY OF LIVING SYSTEMS: A LESSON FROM THE FAILED EXPERIMENTS IN SOCIALIST COUNTRIES

Jixuan Hu

Introduction

To some readers from the West, the point addressed here may seem to be just common sense. However, not all cultures share the same idea of common sense. Ideological bias may cause blindness to or misunderstandings of another culture's common sense. For instance, Western ideas cannot be accepted easily in socialist countries such as China and the Soviet Union, and vice versa, but careful scientific analysis of ideas may produce a better chance of communication between people with different ideologies. On the other hand, what appears to be common sense may be misleading. Many Westerners observe the problems in socialist countries at only a tourist's level. At such a level, phenomena are oversimplified and misunderstood. Thus, larger gaps instead of bridges of communication are created.

Designing a better or even a perfect society is one of the most persistent ideals in human history. From the time of Plato to that of Marx, and even today, finding a blueprint for a better society has been a constant goal.

The communist movement since the 19th century can be seen as an experiment in designing a better society. The core of the design is a centrally controlled social-political-economic system. Marx drew a sketch, Lenin worked out a draft, Stalin standardized the blueprint, and Mao copied most of it. People in power—Tito, Khrushchev,

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Deng, and Gorbachev—have modified it or tried to redraw it. Remarkable results have been achieved and horrible crimes have been committed under the banner of communism.

According to the old “Stalinist model,” which dominated most socialist countries for years, all economic enterprises are controlled by the central state government. The government plans (designs) all aspects of the economy and the society in detail, including what and how much to produce and how raw materials and products should be allocated and transported, as well as prices and investments. Furthermore, the government requires the individual to “reconstruct his world outlook,” to “learn from hero models,” so as to become absolutely obedient and, thus, keep the design trouble free.

Numerous economists have pointed out that economic plans in the Soviet Union (and other socialist countries) are often unfulfilled because information flows are always distorted, plans are not perfectly designed but are only the subject of bargaining, and planners are adapting to circumstances as best they can. So the economy is not planned or designed but managed or counterbalanced (Nove 1983). As time passes, the problems of the Stalinist model become more and more obvious.

The pressure for reform in socialist countries has been stronger than the wildest expectations of the designers. Pioneer reforms occurred in Yugoslavia in the late 1950s. Hungary and Poland have also explored new models and alternatives. China started its economic reform, known as “the second revolution,” in 1979. The oldest “socialist brother,” the Soviet Union, began its biggest reform in 1985. Recent swift changes in East European countries have shown that more and more people have begun to admit that classic socialism does not work, that it needs to be changed. However, why it does not work and how to change it are controversial issues that remain unsolved both in theory and in practice.

All of the reforms mentioned above have at least one common characteristic: the decentralization of power or abandonment of the Stalinist model. However, some decisionmakers in the reforming socialist countries are still seeking other, presumably better, blueprints for designing their societies. Most of them think that the problems were caused by wrong or imperfect blueprints or by incorrect implementation. Thus, their efforts are devoted to modifying or redrawing the original design.

Nevertheless, theoretical failures in designing social systems are also widely noted. Works on econometrics are sometimes criticized as “the economics of paradise,” which has no use for the real world. Computer socioeconomic models, no matter how sophisticated, seem

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to bring more questions than answers to the hopeful designers. Still, efforts are being made to create new designs for society. Even the methods of cybernetics and systems engineering are being used. One example is Manescu's "General Cybernetic System of the National Economy" (Manescu 1978), but that model seems not to be doing well in guiding Romania's economy. However, the ideal of a better designed society is so attractive that people keep trying.

Human ideals can be put into two categories: achievable and unachievable. Unachievable ideals can be misleading and dangerous. They are usually shown to be unachievable by developments in science. For example, the ideal of inventing "perpetual motion machines" was identified as unachievable by the law of conservation of energy in physics; the ideal of making "medicine for immortality" was rendered unachievable by the principle of function alienation in systems theory (Jin 1988).

The purpose of this paper is to analyze the ideal of designing a perfect society, or "the long term and great ideal of communism." Is it also unachievable? The principle of nondesignability of living systems presented in this paper sheds some light on the answer. The paper is divided into five sections. Section one will offer a definition of design, clarifying the four elements needed for any successful design. Section two will explore six specific characteristics of society, referring to some new developments in systems theory, and will present a social uncertainty principle. The discussion in section three will be the main point of the paper: Living systems such as societies and human minds are not designable in an engineering sense. In section four, I shall briefly describe several pathological phenomena, which are the consequences of forcibly designing the undesignables, in socialist countries. The concluding section will propose an epistemological change to new ways of thinking.

What Do We Mean by Design?

This section will first clarify the meaning of design: A definition will be generated based on the four basic elements of design. Then I shall discuss some immediate implications of the logic of designing a society and shall raise the question of whether or not everything in a society can be designed.

Definition by the Four Elements of Design

The ordinary meaning of "design" is fuzzy. In English its synonyms include to plan, to make a blueprint, to purpose, to cast, to project, to map out, to devise. The common meaning of the verb

“design,” according to *Webster’s Ninth New Collegiate Dictionary*, is “to conceive and plan out in the mind; to have as a purpose; to devise for a specific function or end.” Technically, the term is used for the construction of a model from which a machine, a device, or an instrument can be built to perform certain functions to meet specific needs.

In 1976, a Chinese scholar pointed out that there is an isomorphism between machines and natural regularities (Jin 1986). That means that for every element of any machine, there is a corresponding element of “natural law” that guarantees that the element in the machine will function exactly as the designer of the machine expected. The idea has not received enough attention, but it is helpful when searching for a precise definition of “design.” There are four basic elements included in the concept of designing a machine: (1) a purpose or goal, (2) a group of “regularities” as the base, (3) a model or a blueprint as the interim product, and (4) a process of transformation from the model to the machine. On the basis of those four elements, one is able to obtain a functioning machine as the final product. I would call them the four elements of design. Examples supporting that idea can be found in any engineer’s textbook, although they may not be stated the same way.

Some of the four elements may not be achievable under specific conditions. Nevertheless, the four elements can serve as criteria to check whether or not a specific design is feasible. The first element indicates that an explicit objective function will be needed by a designer. The third and fourth elements imply that the model must be stable, at least during the time necessary for transformation.

The most important element, which is usually overlooked, is the second one. It means that any design of any machine or device is based on a finite set of natural laws or observed regularities. Those regularities are also understood by constructivist cyberneticians as “consistencies.” Let us name that set, set C. Without set C, no feasible design is possible.

Identifying set C is the very first step toward design. Some designs, however, can be carried out even though one element (sometimes more) of set C is not identified. When that happens, we say a new invention is created, because some new regularity or consistency of nature, or new natural law, is added to human knowledge in the process of designing.

We can now offer a more rigorous definition of design:

To design is to construct a model based on a set of consistencies observed from the related system; this model possesses an objective

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function that, when the model is transformed into a machine, will meet the purpose(s) of the designer.

That definition will satisfy most engineers and actually describes design in the engineering sense. There are other meanings of design used by other people. I suggest we give other kinds of designing different names, such as “framing” and “seed forming,” which I shall discuss later. In this paper, I will stick strictly to the meaning specified by the above definition when using the word “design.”

Implied Consequences of Designing Society

The idea of designing a society in the way one designs an airplane sets up a whole world outlook. The state is viewed as a machine. The party is a fighting machine; the government is a control center. The political leaders are the geniuses, guiders, commanders, steersmen, and finally great general designers, while the ordinary people are screws and gears.

Gears may be big or small and may work in different locations in the machine. Screws should stay wherever the party wants them. According to the official explanation, gears and screws are designed equal (they are not “created equal”), only the duties assigned to them are different. That explains the structure. Sometimes gears and screws get rusty or need to be replaced, cleaned, or repaired. That explains the normal process of maintenance. When something is wrong, it is the controller’s exclusive duty to fix it. Ideally, when nothing is wrong, when the machine (society) is running fine, every gear and screw leads a happy life.

How can individuals be made into gears and screws? The answer is by design (i.e., by putting people into educational machines). They include schools, meetings, political studies, study seminars, propaganda, and finally labor camps and jails. Standardization and trivialization of individual minds become the daily practice.

In spite of any possible value judgment about the above ideas, we can use a scientific approach to examine the issue. The development of cybernetics and systems theory indicates that systems created by nature are very different from engineering systems. All systems may be classified into two categories: designable and nondesignable. Engineers are familiar with designables. We are going to explore what the term “nondesignable” means.

Special Characteristics of Human Societies

In order to examine the meaning of a nondesignable system, I shall introduce six specific characteristics of human society and the human

mind in this section: (1) nontriviality; (2) self-steering, autonomy, and autopoiesis; (3) the gaming phenomenon; (4) Arrow's impossibility theorem; (5) complexity and information limit; and (6) self-organization and evolution. Those characteristics have been examined in the fields of cybernetics and systems theory, except Arrow's theorem, which comes from welfare economics. They are all contradictory to the requirements of design. Moreover, at the end of this section, I shall present a social uncertainty principle, which may be seen as a social version of Heisenberg's uncertainty principle in physics.

Nontriviality

Trivial machines and nontrivial machines are concepts used by von Foerster to draw an important distinction among systems. A trivial machine is characterized by a one-to-one relationship between its input and output (i.e., its stimulus and response). That invariable relationship constructs the machine. It is predictable as well as designable. "All machines we construct and buy are, hopefully, trivial machines. A toaster should toast, a washing machine [should] wash, a car should predictably respond to its driver's operations" (von Foerster 1981). Trivial machines are useful and reliable tools.

A nontrivial machine's output, however, will depend on its input and its history. Here its history means the accumulated impacts of its earlier inputs. An earlier input may change the internal state of such a machine to such an extent that the same input will be responded to differently later. Thus, such a machine is nonpredictable. In other words, the internal state of nontrivial machines is always changing.

Human beings, if they have to be modeled as machines, are nontrivial machines. Human creativity, a vital element of the progress of civilization, grows from that nontriviality. In fact, the phenomenon of nontriviality can be observed in all living organisms. According to von Foerster (1972), a dangerous tendency in civilization is the trivialization of human beings, for example, a dogmatic educational system that gradually ruins students' creativity.

Although the tendency toward trivialization can be observed in all cultures, it is most intense in socialist countries. In order to be used as reliable parts in the whole design, individuals are required to be, and are educated into being, revolutionary screws or gear wheels (i.e., totally predictable trivial machines). The designers may not realize that they are, in fact, using a clockwork universe view of the 19th century. The strong trivialization effect caused by the attempt to design society ruins the creative incentive of individuals. The consequences of such a loss are tremendous and obvious.

Self-Steering, Autonomy, and Autopoiesis

Self-steering (Aulin 1982) is an important characteristic of the actions of individuals and communities. Research in neurophysiology and cybernetics has revealed that self-steering cannot be formalized into some trivial, objective natural laws. In other words, it has a subjective feature. Thus, self-steering does not fit the requirements of design. The designer has two options: he may either deprive human beings or communities of that property or face the failure of his design.

A mark of the mature development of the human mind and society is autonomy, which can be observed in self-steering and self-authorization (Umpleby 1986). The development of autonomy can be observed as a child grows up or in human history. Designs implemented in socialist countries often deprive individuals and communities of autonomy.

Another model for autonomy is the theory of autopoiesis. Autopoiesis is "the process whereby an organization produces itself. An autopoietic organization is an autonomous and self-maintaining unity that contains component-producing processes. The components, through their interaction, generate recursively the same network of processes that produced them. An autopoietic system is operationally closed and structurally state determined with no apparent inputs and outputs. A cell, an organism, and perhaps a corporation are examples of autopoietic systems" (Varela 1979; also see Maturana 1975, Zeleny 1977).

The Gaming Phenomenon

As a result of our experiences in building a dynamic model of an economic and social system for a province in China in 1985 and our observations of what was happening in the practical operation of China's economic system ("The authority issues a policy; we tackle it with our own strategy" is often heard among business managers), my colleagues and I started to feel that it may not be possible to design a social system in the same sense that one designs an airplane.

In designing an airplane, you put all the proper parts in their proper places according to a blueprint, and the whole assembly flies. But when the elements of the system are gaming with each other, how can one assemble them? What kind of system would it be, and what model or theory can be applied when the system consists of competing elements?

Von Neumann and Morgenstern's (1947) game theory offers some guidance for tackling the gaming phenomenon. The problem with design arising from that phenomenon is that stable consistencies

cannot be identified while one element's behavior is dependent on another element's behavior. An airplane's components do not game each other for their own purposes, but those in a social system do. Thus, finding set C, specified in the first section of this paper, becomes a problem.

Arrow's Impossibility Theorem

An important breakthrough in welfare economics was Arrow's impossibility theorem in his social choice theory (Arrow 1951). The guiding question of Arrow's social choice theory is whether it is possible to obtain a social choice, or a social welfare function, based on the choices of individuals under certain rational conditions. Such an objective function will be needed in any design as the first of the four elements. The answer, based on the mathematical work of Arrow and others, was no.

Arrow's impossibility theorem states that it is generally impossible to find a set of rules, or a program, from which one can derive a rational social choice function based on the choices made by individuals. In other words, when we try to design a society, it is impossible to find an objective function agreed on by everyone in the society. The designers of socialist societies might have already known that before Arrow. They have used a simple algorithm to solve the problem: "Our design is for all the people. If you do not agree on the goals and the arrangement, then you are not people, hence you are an enemy of the people." Readers from socialist countries are not surprised by such logic.

Complexity and Information Limit

People would agree that social systems are complicated. Any attempt to design a social system must face the issue of complexity. Recent research on complexity has reached the following conclusions: First, complexity is related to the observers of the system via their "notions, perceptions, interests and capabilities"; second, complexity is also related to the system being observed via "the number of elements, the number of relationships among the elements, non-linearity, asymmetry, and non-holonomic constraints" (Flood 1987).

Putting aside the other elements of complexity mentioned above, we discuss only one here, the number of relationships among the elements of the system. W. Ross Ashby (1962) pointed out that in a richly interrelated system containing 1,000 variables, if each variable had only two states, the information needed to totally understand such a system would be 10^{100} bits. That is far beyond Bremermann's

(1967) information limit, which is 10^{47} bits per gram per second. Ashby (1972) wrote:

Because of the quantal coarseness of matter, nothing made of it, machine or brain, can process information faster than about 10^{47} bits/g/sec. Take tons of computer and decades of time, and no feasible computation can handle more than about 10^{60} to 10^{70} bits.

And again Ashby (1973) wrote:

When interaction occurs richly (the case that cybernetics is specially interested in), the quantity of information implied by its complexity is increased exponentially rather than by multiplication.

That fact at least suggests to us that the information processing involved in any rigorous engineering design of a large system, such as a society, is beyond the power of the human brain plus tons of computers. The only way to design such a system is to abandon the attempt to design everything in detail and control aspects of everything. Ashby (1962) contributed a "law of requisite variety," which shed light on new ways of dealing with complex systems. That law states that the control achievable by a given regulatory subsystem over a given system is limited by the variety of the regulator and the channel capacity between the regulator and the system.

Self-Organization and Evolution

Research on self-organization has become one of the hottest frontier fields of system theory in the last 30 years. The basic idea is that organizations come into being by themselves. Order emerges by evolutionary processes, not by design. Those phenomena are widely studied in physics, chemistry, biology, ecology, physiology, psychology, sociology, and cultural studies. Some of the important studies are of dissipative structures, synergetics, and chaos theory (Prigogine 1977, Hanken 1981, Feigenbaum 1980). The general theoretical studies have been carried out in the field of cybernetics (von Foerster 1960, Ashby 1962, Umpleby 1976).

One of the models used to describe the process of self-organization and the mechanism of evolution of such systems is the model of organizational seeds and dual-phase mechanism. An organizational seed is an abstract (mathematical) operator describing a circular cause-and-effect relationship among a set of variables that can lead to spontaneous order. The dual-phase mechanism revealed that the development of a living system relies not only on deterministic causalities but also on random fluctuations (Hu and Sun 1989).

Healthy societies and healthy minds are self-organizing systems. They cannot be designed by outside designers, no matter how good

the designers are. One may say that there is a way to design the human mind; just block out all outside information, or stop the flow of information. But that will stunt the growth of the mind or severely retard it. A society, even a designed one with a totalitarian government that seems to control everything, still cannot avoid the natural process of self-organization. The only difference is that it will happen in unhealthy ways; one example is the phenomenon of the nomenclatura, which I will discuss later.

Social Uncertainty Principle

Similar to the well-known Heisenberg uncertainty principle in quantum physics, a social uncertainty principle is presented here as the seventh or perhaps the final barrier to the dream of designing a society.

Heisenberg's uncertainty principle tells us that if the behavior of the observer unavoidably influences the state of the system being observed, then the result of the observation is uncertain. That happens when physicists try to observe the behavior of elementary particles. The behavior of the particles may be unavoidably influenced by the observing process, or the choice of observing one aspect of the particles (such as momentum) may make another aspect (such as position) undecidable.

In human society, however, the uncertainty principle occurs on two levels. First, when an observation of a social system is made, there is no way to guarantee that the observation is objective. Soros (1987) called the phenomenon "participatory bias." Constructivists (e.g., von Foerster, von Glasersfeld, and Maturana) have deeply explored that notion. The first level could be called the level of objectivity. Second, when a social system is observed, a model of the system is constructed and predictions about a future state of the system are made and acted on; the system will be changed by those predictions. Prophecies are either self-fulfilling or self-defeating—a feedforward effect.

Feedforward may be explained as a phenomenon symmetrical to feedback. While feedback refers to the mechanism of the effect as a cause, feedforward denotes the mechanism of prediction (of effect) as a cause. Originally, feedforward meant that information about the anticipated results of a process was used to modify the process itself. Soros (1987) calls it the "reflexivity principle" in the field of money markets.

Thus, our social uncertainty principle could be stated as follows:

The consistency or regularity of a social system obtained via the observer within the system, and the predictability of observations

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based on such consistency or regularity, is neither objective nor stable.

Many works support that principle. I shall pick just one example. After researching some new developments in sociology, mathematics, neurophysiology, philosophy, phenomenology, and cybernetics, Umpleby (1976) concluded that objectivity is only "shared subjectivity." The effort of obtaining objectivity becomes essentially a matter of achieving agreement. He classified such objectivity as "contested objectivity," comparing it with the earlier "unquestioned objectivity" and "constructed objectivity." Thus, a new understanding of the limits of human knowledge has been offered.

According to Umpleby (1976), three major problems make the ideal of objectivity impossible: (1) Theories of social systems often change the way those systems operate; (2) the scientist offering a theory of a social system is usually an element of the system; and (3) observations must, of necessity, include the characteristics of the observer. We can see that the first problem is the feedforward effect. The other two concern objectivity.

Nondesignability of Living Systems

In this section, I will address the main point of the paper: Because of their specific characteristics, living systems such as societies and human beings are not designable in an engineering sense. The nondesignability of living systems should become a basic principle in human knowledge, if not common sense. That principle should offer some guidance for the reform of socialist countries.

The properties of human societies or social systems, discussed in the last section, are more complicated than the properties of mechanical machines. Human understanding of complex systems has now gone far beyond what was known by Marx and Engels, who proposed their grand theories and started the communist movement over 150 years ago.

Our new understanding of complex systems leads to the conclusion that designing a better society in the same way that one designs an airplane is only an illusion. That illusion has attractions similar to those of the ideals of inventing perpetual motion machines or achieving immortality. Such illusory ideals have been rejected one by one as science has developed.

From the special characteristics discussed earlier (nontriviality, autonomy, the gaming phenomenon, Arrow's impossibility theorem, complexity and information limit, and self-organization), we can see

that the concept of “design,” in the engineering sense, is not going to bring us a better society. The four elements of design are not compatible with the characteristics that are vital properties of human society and the human mind as living systems. By the standards of engineering design, societies and minds are not designable. Even if the design process is carried out properly and all the intended actions are taken, the results, as we shall see in the next section, do not correspond to the original blueprint.

Some communist leaders still believe that Marxism is the utmost achievement of human thought, and the goal of communism is an absolutely correct implementation of “Marxist science.” The only way for them to refute this paper academically will be to develop Marxism to a higher level, at which it would be able to offer a better understanding of the phenomena discussed in the second section. They will also have to cure the social diseases, caused by forced design, that we are going to observe in the next section.

Consequences of Forced Design on the Nondesignables

People who believe in Marxism have made tremendous efforts to design whole societies, as well as the minds of the people in those societies. In the beginning, that seemed to work well when the economies of the countries were recovering from the damage of wars. But as time went by, severe consequences emerged in various areas.

In this section, I will identify some major problems that have occurred in socialist countries as a result of trying to design both society and individual minds. Treating society as a machine, and individuals as its parts, has caused the following nine widely observed undesirable phenomena: the phenomenon of strong political control, the phenomena of strong economic control, the hidden nomenclatura, the movement phenomenon, the blindness toward damages, the peacock phenomenon, the dual-personality phenomenon, the childish phenomenon, and alienation. In my opinion, those phenomena are generated by neglecting the special properties I pointed out earlier. They are special social diseases that have infected almost all of the socialist countries.

The Phenomenon of Strong Political Control

The first direct consequence of designing a society was that a strong dictatorship, called the people’s democratic dictatorship earlier and the proletarian dictatorship later by Mao, became logical and unavoidable. People who favor such a dictatorship do not like the

word “totalitarianism,” but it expresses the fact that it is the government, not the people, that controls everything.

Some people still believe that strong control is good and will work wonders. But more and more people are beginning to say no to strong control. “The administrative-command system had spread to its superstructure, restricting the development of the democratic potential of socialism and holding back the progress of socialist democracy” (Gorbachev 1987, p. 25). “The progress of socialist democracy” was held back by the following systems for dealing with people, people who are “parts” in a designed machine: residence control, personal political archive monitoring, information control, and thought censorship system.

The oppression of independent thinkers becomes a normal practice in such societies. There are two ways to treat two kinds of intellectuals: The way to treat physical science and engineering professionals is to “make good use of them” and “treat them with good policy.” The way to treat those who are able to think on their own is to remold their minds, either by persuasion, called “talking heart,” or by force. There are too many cases to be listed here, so I will mention just one. The number of people labeled rightists and forced to be remolded by the Chinese Communist party in 1957 was 550,000 (Dai 1989). Those people lost their youth, their minds, and even their lives just because they expressed their own opinions.

The Phenomenon of Strong Economic Control

Strong central control in the economic arena created the following problems for the designers:

- A rationing system for food allocation, housing, medicine, and education became a heavy burden for the government.
- The resource allocation systems are always making mistakes. the demands are always bigger than the supplies.
- The planned budgets always suffer from the “investment hungry syndrome.”
- The “socialist wage rigidity” and “the big rice pot, the iron rice bowl” cause low efficiency.
- There always exists under-the-table gaming behavior between businesses and government.
- The lack of technical innovation provides no incentives or conditions for improving production.

In fact, the pioneer reform economist Kornai from Hungary pointed out that the major reason for the shortage economy in socialist countries is not mistakes in policymaking and decisionmaking but the

arrangement of the system (Kornai 1980). I would say the misfortunes are not caused by mistakes in some specific design (thus, they cannot be mended by another design) but by the very approach of designing.

Other detailed research done by a group of young Chinese economists also concluded that the control system in socialist countries has caused all the troubles. They propose “a shift in the means of regulation” (Fu, Shi, and Jin 1986). Such a shift would mean the acknowledgement of self-organization and abandonment of strong control.

Nomenclatura: A Hidden Structure

It has been disclosed that there exists a hidden structure within the socialist administrative-command government system, the “nomenclatura.” According to Lepin (1991, p. 483):

The nomenclatura is not a management group, nor a bureaucracy, but only the part of the bureaucracy that occupies key positions in the party, state, or economic apparatus. The nomenclatura is not elected by the masses but is appointed from the top by one person or by a group of people. . . [It] is neither amorphous nor hierarchical but rather it is a corporately organized social group. It consists of representatives of the various classes and social groups, and subsumes differences in viewpoints by arranging its members in various nomenclatura positions. It has clearly fixed values and rules of the game, the breaching of which is punished severely.

The nomenclatura is formed by the process of self-organization, which is a natural social phenomenon. However, because socialist society is supposed to be beautifully designed, things like the nomenclatura have to be hidden from the public. They are a result of self-organizing power struggles that do not fit the designers' blueprint.

Attempts to hide the nomenclatura have generated a strong in-group and out-group split in society. So there are inside documents, inside books and journals, inside decisions. Since the “inside” cannot be exposed to the public, no free press is allowed.

The Movement Phenomenon

Another regular macrophenomenon is that political movements always emerge. The meaning of the word “movement” as used here may be new to Western readers, but people from socialist countries are familiar with the concept. Examples in China include Anti-Three, Anti-Five in 1952; Collectivization and Anti-Gao and Rao in 1953; Eliminating Reactionaries in 1955; Ownership Remold in 1956; Anti-Rightists in 1957; Three Flags in 1958; Anti-Peng's Group in 1959; Anti-Soviet Revisionism in the early 1960s; the Four Clean-

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ups in 1964; and the climax, the Great Proletarian Cultural Revolution from 1966 to 1976.

Officially, those movements are called “mass movements,” which sounds like ordinary people initiated them. But those movements, in fact, “moved the masses”; people were manipulated, intimidated, or fooled. Each of those movements was officially announced as a “great victory” for the party and for the people. So far, nobody has been able to investigate exactly how much damage was caused by those movements.

Such movements all have a common purpose: to modify an earlier design or to redesign society. They all have one of two causes. Either they implement a big shift in economic policies or they represent a political struggle within the nomenclatura. The former cause is an effort to change the design; the latter is a fight among designers.

Ordinary people are very tired and afraid of political movements, but they keep happening. Mao used to say that a movement such as the Cultural Revolution “should be repeated every seven or eight years.” Mao not only enjoyed instigating movements, he also noted that it would be necessary to modify the design from time to time to keep society going. If the principle of nondesignability is not recognized, harmful movements will continue to occur.

Blindness toward Damages

Because designing is seen as a great achievement, any criticism of or friendly warning about the current system will be interpreted as hostility to the designers who hold power. That way of thinking has caused many tragedies. The result is that errors in and damage to the system accumulate before they are noticed by the power holders. Almost all forecasting research is aimed at describing a beautiful future and an exciting blueprint. Public research on the flaws or potential crises in society is forbidden (He 1988).

Even after the damage is noticed, any reaction is delayed by the ever-expanding bureaucratic system. There is a socialist version of Parkinson’s law: Whenever a new need arises in society, a new office will be established in the government; thus, the system expands very rapidly and is dehumanized rapidly. Because extremely limited autonomy is allowed in low-level offices, many decisions have to be handed up to the higher levels. (It has been reported that the first decision about whether a Chinese citizen would be allowed to marry an American had to be made by the paramount leader, Deng, in the early 1980s.)

The Peacock Phenomenon

Although the peacock phenomenon is found in all kinds of societies, the lack of power balance and the constraint of public opinion extend it greatly in socialist countries. The design-oriented power structure often bases decisions on vainglory, in order to show how successful the design is. Money is often spent on short-term achievements, because they show up quickly, whereas long-term needs are often ignored.

Just to mention one example: Beijing spent over 5 billion renminbi (RMB) on the 1990 Asian Games (Zhang 1990), in spite of the fact that at least 20 million people are living below the poverty line, that the country's economy is in a severe situation, and that there is a very serious shortage of funds for the country's educational system. Those facts render the party's slogan, "to serve the people wholeheartedly," ridiculous.

The Dual-Personality Phenomenon: Split Minds

Living under a problematic design, seeing its dysfunctions, but not being allowed to talk about things as they are will cause an individual's mind to split into two parts. The designed, official part of the mind is active in offices, meetings, political studies, and public speeches. The undesigned, private part of the mind is active at home, among friends, and at unofficial gatherings. Saying one thing and thinking another is a normal practice, a standard by which to measure whether or not a person is mature.

In his New Year's Day address, the new president of Czechoslovakia said, "The worst thing is that we are living in a decayed moral environment. We have become morally ill, because we have become accustomed to saying one thing and thinking another. We have learned not to believe in anything, not to have consideration for one another, and only to look after ourselves" (Havel 1990).

The Childish Phenomenon: Undeveloped Minds

People's minds are not only split, they are also retarded to some extent—like hothouse plants. Because the designers arrange everything, the independent mind has no chance to grow. That infantization of people is caused by the government through its implicit "policies for fooling the people." As a result, people are found to be "timid," to "fear responsibility," and to live "in the grip of obsolete rules and instructions" (Gorbachev 1987, p. 43).

There are always enemies designed to explain to the public all the phenomena that do not fit into the frame of the official world view. The American imperialists, the Soviet revisionists, and the bourgeois

liberalization are often the scapegoats for the problems of designed societies. Blaming outside elements is another sign of immaturity. It also prevents the development of more realistic concepts, such as cooperation, coexistence, and coevolution.

The Alienation in Socialist Countries

Soviet scientists have offered a generalized view of some of the problems. Using a Marxist term, "alienation," Lapin (1991) points out that in the Soviet social system before perestroika started, the people were alienated from power, the wages were alienated from labor, the peasants were alienated from the land, the production was alienated from needs, the nation was alienated from the citizens, and individuals were alienated from feelings of security.

I would add that the results of socialism were alienated from its original good intention. That understanding has not been reached only by China's young generation through extensive study; it is also seen by many people from the old generation, even though most of them devoted their lives to the seemingly attractive ideal of communism.

Conclusion: Epistemological Change from Dos to Don'ts

Trapp (1986) asked, "Is it possible, at all, to design a political or economic system without considering killing, torture, and oppression?" The answer is clear now.

Almost all of the current reforms in socialist countries are aimed at removing the problems mentioned in the last section, although there are disagreements on what causes those problems. In my view, those phenomena originated from, or at least are related to, an unachievable ideal: designing a better society and, accordingly, designing a new kind of human being. That is the fatal mistake of the current communist ideal. Trying to forcibly design society and human nature causes tremendous problems—both are nondesignable systems.

Nevertheless, nondesignability does not mean nothing can be done to improve our society. Let us go back to our analogy at the beginning of this paper: Although there is no hope of making perpetual motion machines, we have built efficient machines. Although there is no hope of producing medicine for immortality, the human life span has increased and the quality of life has improved. So, although a perfect society is not achievable, there are ways to improve existing societies. New ways of thinking can help us find new directions.

How do we think about designing? Look back at the definition in the first section. We first set up a group of goals according to our value system; then we look for a set C as a base on which to construct the blueprint, and we carry on from there. The design, if realized, would result in a very large set containing a tremendous number of rules about what we should do, when, where, and how. However, this discussion has shown that that is impossible. So we may look at our value system from another angle. We may pay attention to the negative values, to the things we do not want. If we have to stop building the optimized objective function for the social system, we may concentrate on preventing things that our value system rejects.

By setting up a minimum group of constraints and letting human creativity work freely, we can create a better society without having to design it in detail. That is not a new idea, it is the idea of law, the idea of a constitution. Real constitutional government is a possible alternative to the dream of a perfectly designed society. "To design" is replaced by "to manage," "to regulate," and "to participate." Regulations come into play only when errors occur. In that way, we offer space for variety, flexibility, and development in our social system.

That way of thinking may be called limited design by some system scientists. The idea is to apply the principle of self-organization. I think it would be confusing to continue to use the word "design" and, therefore, suggest we choose other terms such as "framing" and "seed forming." Framing sets the constraints that represent our negative value system, such as the establishment of a legal system. Seed forming introduces mechanisms that work automatically, such as the market mechanism. New light is shed on a saying of Confucius: "People should be allowed to be free by themselves; they should not be told to behave."

Ashby's law of requisite variety may be another helpful guide in building a small, efficient government. In other words, the degree to which an organization can be regulated is limited by the variety of the organization's regulatory systems. That implies that distributed power or pluralization may achieve better management (see Ashby 1981).

Many scholars referred to in this paper have been looking at complex systems in different ways. Compared with the traditional methods (usually Newtonian), the new approaches open new doors to understanding and managing complex systems.

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