

ECONOMIC CHAOS OR SPONTANEOUS ORDER? IMPLICATIONS FOR POLITICAL ECONOMY OF THE NEW VIEW OF SCIENCE

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Introduction

Ideas about political economy, like other products of human culture, are liable to being profoundly influenced by underlying conceptions of the nature of science. Socialist political economy was not just influenced by the 19th-century view of science, it was modeled on it. Marxism has been widely interpreted as a “scientific socialism” in a strictly Newtonian sense, a study of the “laws of motion of the capitalist system” analogous to the physical laws of motion of planetary systems. I will later take up the question of whether this is the best way to read the essential message of Marx, but in any case it would certainly be understandable if many aspects of the Marxian system of thought were tainted by the mechanistic model of the universe in which 19th-century culture was embedded. The great successes of Newtonian mechanics made them a natural object at that time for emulation in the study of human society. But other, non-Newtonian, sciences have by now been successful too. Even thermodynamics and organic chemistry exhibit features that do not fit well in the mechanistic Newtonian view of the universe, and if we consider biology, anthropology, intellectual history, or psychology, we find fields that have made enormous accomplishments over the past century without coming close to the Newtonian model. The argument from success no longer makes a good case for the mechanistic view of the world.

There is now a wide body of explicit philosophical literature that, for want of a better label, I will simply call the new view of science,

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which develops a way of coming to terms with the nonmechanistic nature of the universe.¹ This literature constitutes, among other things, a radical reinterpretation of the nature of order, and a powerful critique of the Newtonian vision. It carries important implications for a variety of scholarly disciplines, from mathematics to the natural and social sciences, to the humanities, and it has begun to serve as an inspiration for practical proposals in everyday life.

In the contemporary work on "chaos theory" in mathematics, things that would appear to be utterly disorderly by Newtonian standards are seen to nevertheless possess great intelligibility, even mathematical elegance and beauty. The theory is misleadingly named because what is being celebrated here is not really utter disorder but a new kind of order. Scientists have found applications of these ideas in a remarkably wide range of phenomena that exhibit what Erich Jantsch (1980) calls a "self-organizing" process and Ilya Prigogine and Isabelle Stengers (1984) call "order out of chaos." Michael Polanyi, a physical chemist and philosopher of science, coined the phrase "spontaneous order" to describe this kind of process, and he has elaborated on how scientific discovery is itself a spontaneous order. Friedrich A. Hayek, an economist and social theorist, has elaborated on this idea in reference to the ordering processes at work in law and the economy.

One thing all of these spontaneous order theorists have in common is an emphasis on the creative aspect of ordering processes. The processes are not merely "equilibrating" in the Newtonian sense, where there is a deducible "target" toward which forces are pulling. An equilibrating mechanism, like a clock winding down, contains from the outset everything necessary to bring about its conclusion. A spontaneous order exhibits essentially novel changes and needs to work itself out through time. The direction things take may be completely unpredictable, and yet an overall pattern emerges and is systematically discernible.

Just as 19th-century socialists constructed a radical vision based on that century's view of science, so the economic reformers in the People's Republic of China are taking the views of science of our own time as their starting point. The philosophers who seem to have been serving as the inspiration for these reformers, such as Nobel Prize winning physicist Ilya Prigogine, are some of the most articulate spokesmen for the new view of science. The Chinese reformers have already been using this new view of science to revise their interpretation of socialism into a more humanistic and decentralized

¹For a useful summary of the new view of science, see Gleick (1987).

vision. In this paper I will be endorsing the humanistic revision of socialism and elaborating on how I think one of the classic critiques of orthodox socialism is consistent with the new view of science. The older views of socialism, I will be arguing, have been subjected to criticisms along essentially the same lines as the older views of science have been. These criticisms suggest that all the world's governments, whether called socialistic or capitalistic, have been trying to centrally control their economies in a manner that is utterly futile.

Beyond Traditionalism and Modernism

Do we really have to make this tragic choice? Must we choose between a science that leads to alienation and an anti-scientific metaphysical view of nature? We think such a choice is no longer necessary, since the changes that science is undergoing today lead to a radically new situation. This recent evolution of science gives us a unique opportunity to reconsider its position in culture in general. Modern science originated in the specific context of the European seventeenth century. We are now approaching the end of the twentieth century, and it seems some more *universal message* is carried by science, a message that concerns the interaction of man and nature as well as of man with man.

—Prigogine and Stengers (1984, p. 7)

The orthodox view of science that is sometimes called “modernism” arose in reaction to pre-scientific attitudes called “traditionalism.” Traditionalism holds truth to be timeless and discoverable through revelation and by the dogmatic interpretation of sacred texts. It bestows unquestioned authority on a priestly caste, who act as a political elite as well as guardians of social mores. Within this world view, political economy is taken to be largely outside the domain of human choice, the product of supernatural forces guided by the gods. The order we find in the natural world is also intelligible as the conscious design of its creator, within this perspective, so that there is no great chasm separating the study of man from the study of nature. Both can be understood as teleological, as a matter of reading a text. We can read god's purposes in natural events just as we can read them (or perhaps a combination of man's and god's purposes) in human history.

Modernism is a useful label to tag the pro-scientific world view that arose against traditionalism because, to use the words of Donald McCloskey (1985, p. 5), it helps “to emphasize its pervasiveness in modern thinking well beyond science.” According to McCloskey:

[I]n a preliminary way [modernism] can be said to be, as the literary critic Wayne Booth has put it, the notion that we know only what we cannot doubt and cannot really know what we can merely assent to. It is the attitude that the only real knowledge is, in common parlance, "scientific," that is, knowledge tested by certain kinds of rigorous scepticism. Philosophically speaking, modernism is the program of Descartes, regnant in philosophy since the seventeenth century, to build knowledge on a foundation of radical doubt.

The enlightenment represented a major break with traditionalist thinking and led to a radically different view of nature, man, and their relationship to one another. It opened the way for science, which in turn liberated many people from some of the constraints of traditional society. The astonishing successes of science, especially Newtonian physics, led to a momentous transformation of modern thinking. Nature is seen to be the outgrowth of predictable laws that are not the design of any conscious entity, but in principle are subject to human mastery. Natural forces are like mechanisms we invent, so that to the extent we comprehend their systematic elements we can expect to subject them to our purposes. Political economy too can be rendered as a systematic mechanism that can be mastered if we only learn its principles of operation. A central part of the enlightenment was the undermining of established authority and its claims to dogmatic access to the truth. The fruit of this challenge to traditional authority was a new defense of the independence and autonomy of individual human beings, and the realization of greater freedom through the bourgeois revolutions. Society was to be modeled after science in the sense that it was to be universal principles, discoverable by a systematic study of political economy, that would rule, rather than the arbitrary desires of traditional authorities. The rights of man were declared inviolate, just as the laws of nature were. The rulers were to be as much subject to the principles of freedom as their "subjects." The creative powers of free minds have now been unleashed on the world. We find ourselves trying to cope with changes in our everyday lives more rapid than any period in human history. The rise of the enlightenment gives birth to the "modern" world with its dizzying array of new technologies. And of course all this change has given us an accompanying set of new problems.

The enlightenment has led to great advances, but it can also be seen to have led to some shocking catastrophes. The attitude of "modernism" that it spawned leaves a dangerous gulf between our everyday understanding of the humanly meaningful world around us, and our scientific developments. This has had the inevitable consequence that as science advances our society becomes increas-

ingly dehumanized. Within the modernist world view there is no way to make a rational case for any sorts of "rights," and political policy is thus reduced to a problem of social engineering, of using the population as resources for scientific planning. The very gains made by the enlightenment over traditional society, involving respect for the freedom and autonomy of the individual, are now seriously undermined by the philosophical prejudices of modernism.

The gains secured by the enlightenment cannot be simply reversed. Conservative philosophies that essentially wish we could return to the more fixed world of traditional society are still with us, but they are hopelessly utopian. There is no turning back to the (supposedly noble) days when every person was in his place and when we were content to leave our fate to the gods. We cannot address the new problems we face in the modernist age by reversing the great transformations that got us here. We cannot "forget" what we have learned in the advancement of science, nor can we expect people who have tasted freedom to go back to blind obedience to traditional authority.

The new view of science may help us to find a way to retain our modern society's respect for scientific progress without sacrificing our respect for the rights of individual human beings. It may help us to escape from the anti-humanistic attitudes of modernism without reverting to the anti-scientific attitudes of traditionalism.

Time, Complexity, and Humanity in Science

The ambition of Newtonian science was to present a vision of nature that would be universal, deterministic, and objective inasmuch as it contains no reference to the observer, complete inasmuch as it attains a level of description that escapes the clutches of time.

—Prigogine and Stengers (1984, p. 213)

Modernism can be summarized by reference to the way it deals with time and complexity, and the way it fails altogether to deal with humanity, in its conception of science. Time is reduced to a fourth dimension, fully analogous to spatial dimensions, and thus loses an aspect that, in our everyday experience, seems essential to it: its irreversibility. Complexity is treated not as an inherent feature of the world but as a temporary problem of our insufficient knowledge, to be overcome by reductionist methods. Humanity is to be either kept outside the scientific process as if it were a source of contamination, or reinterpreted so that it too is a timeless and ultimately simple mechanism. Each of these concepts would, if it were taken seriously, pose a challenge to the universality of the modernist world view, and thus each is diminished and transformed by modernism into a pale imitation of what we mean by it in everyday life.

Modernism would like us to believe that it is merely our pre-scientific illusion that time is irreducible to space, that complexity is irreducible to simple and controllable causes, and that humanity is irreducible to mechanism. Thus it forces on us a dangerous dichotomy between science and life. Nature appears to be a timeless mechanism entirely foreign to our human experience of the world as "in time." It is supposed to be comprehended by reducing it to more basic and simple forces, by dissecting it into its elementary parts, whereas our human world seems only explicable in terms of complex wholes. Everyday experience and the humanities, which take that experience as real, are both "scientifically suspect" in the modernist culture. And it works the other way too: Many outside the scientific community find science itself "humanistically suspect." The much lamented split of our society into two deeply separated cultures is the result of a particular view of science.

The point of the new view of science is precisely to show that modernism does not only fail to do justice to everyday life and the humanities; it fails to do justice to most of the natural sciences themselves. Except for certain parts of classical mechanics, most of science today constitutes a challenge to the modernist view. Little of the natural world exhibits the kind of pure deterministic mechanism to which modernism sought to reduce everything. Even in physics, indeed in the very heart of physics, we find irreversible processes that defy the modernist view of time and complexity. Thermodynamics and physical chemistry are filled with processes that are irreducible to simple elements and relationships and are in principle irreversible in time.² And the impossibility of removing the observing subject from the scientific study of objects has been reinforced from within quantum mechanics by the work of Heisenberg. One does not have to be an anti-scientific metaphysician to question modernism.

As one moves up what we might call the scale of complexity from those simple phenomena that are amenable to Newtonian modeling through the more complex physical sciences and into the sciences of life, we find a greater and greater scope for nonmechanistic ordering processes, that is, processes that are intelligible but not predictable.³ These processes take place in time as irreversible changes so that the question "When did it happen?" is not optional but central to

²See Polanyi (1958) and Prigogine and Stengers (1984).

³There is a long scholarly tradition of defending the human sciences against encroachment by the modernist view of science, but this methodological-dualist position concedes too much to modernism with respect to the natural sciences. On the idea that the differences between the natural and human sciences are of degree rather than of kind, see Polanyi (1959) and Hayek (1955, 1964).

understanding what it was that happened. Such complex processes can be understood not in the sense that they can be simulated by simple models, but in the sense that they can be explained as resulting from general principles that have been found to govern this kind of process. We cannot deterministically model the biological process by which the human brain evolved, for example, nor can we predict where evolution will take us in the future, yet I think it is fair to say that we understand a great deal about this evolutionary process. And of course the place of man within science changes too as we move closer along the evolutionary path to the higher forms of living intelligence, and ultimately to ourselves, perhaps the most complex things we find in nature. The new perspective on science finds all the sciences and humanities on a continuum, all involving time, complexity, and humanity, varying only in degree, not in kind.

One of the great controversies of philosophy at the turn of the century was over whether the historical and human sciences are philosophically legitimate in light of the (then) obvious fact that they bear so little resemblance to the methods of the natural sciences. The procedure of simply telling a plausible story that fits the evidence seemed inadequate to give historical research scientific legitimacy. Today the tables have turned. The irreducible complexity and irreversible processes of history and the room history gives to the human subject no longer make history scientifically suspect. In short, the change from modernism to the new views on science is the change from the "scientization" of human beings to the humanization of science.

Mechanism and Order; Control and Cultivation

Even if we cannot control the external circumstances at all, we may adapt our actions to them. And sometimes, though we may not be able to bring about the particular results we would like, knowledge of the principle of the thing will enable us to make circumstances more favorable to the kinds of events we desire. . . . An explanation of the principle will thus often enable us to create such favorable circumstances even if it does not allow us to control the outcome. Such activities in which we are guided by a knowledge merely of the principle of the thing should perhaps better be described by the term *cultivation* than by the familiar term "control"—cultivation in the sense in which the farmer or gardener cultivates his plants, where he knows and can control only some of the determining circumstances, and in which the wise legislator or statesman will probably attempt to cultivate rather than to control the forces of the social process.

—F. A. Hayek ([1955] 1967, p. 19)

If what was orderly about the world was only that in it which was pure mechanism, essentially timeless and simple, it would make sense to confine science to the search for strict Newtonian predictability. Anything, however complex, that we could not reduce to a fixed mechanism, to an underlying simplicity, we would sensibly label chaotic. Either something is "known" in the sense that it can be deterministically modeled as a predictable system like the orbiting planets, or it is unknown. The new view of science liberates us from this situation. Things that would appear chaotic to the modernist seem quite orderly to the proponents of the new view of science.

As Polanyi's work on science as a spontaneous order shows, the modernist conception of the nature of knowledge is fundamentally flawed. Modernism treats the process of science as if it were a matter of an isolated mind confronting and mastering the natural world. A single scientist follows given methods to bring nature under his rational control. The new view of science urges instead that it is the *dialogue* taking place in the scientific community as a whole which is the proper locus of analysis for the philosophy of science. It is the uncontrolled "dialogical" process that brings knowledge to the participants, not the strictly controlled "monological" methods of any particular scientist.⁴ The process of mutual interpretations and criticisms going on in the scientific community is a good example of an order that emerges out of an apparently haphazard chaos. The process works best precisely when it is *not* under any one mind's control but is allowed to evolve by its own logic, taking advantage of the variety of perspectives it contains. A healthy scientific community cannot be designed in detail, it can only be cultivated by setting up conditions where the freedom of individual scientists to pursue their own hunches is protected.

The "order" we find in a spontaneous order process may be closely akin to that of a story whose plot we can "follow" without claiming to be able to anticipate it from the outset. Here the theory of narrative as it has been developed in the study of history and fiction is relevant to scientific explanation. As the philosopher Paul Ricoeur has shown, the articulation of history has an irreducibly narrative character, and good history shares many of the attributes of good fiction.⁵ Essentially to impart the subjective meaning and significance of events in history involves us not in a mechanistic search for determinate laws but in

⁴For a useful summary of the contemporary philosophy of science literature in terms of this contrast between monological and dialogical processes, see Bernstein (1983).

⁵See Ricoeur (1983, 1984).

the uniquely human act of storytelling. As Ricoeur (1981, p. 277) put it:

[T]o follow a story is to understand the successive actions, thoughts, and feelings as displaying a particular directedness. By this I mean that we are pushed along by the development and that we respond to this thrust with expectations concerning the outcome and culmination of the process. In this sense, the "conclusion" of the story is the pole of attraction of the whole process. But a narrative conclusion can be neither deduced nor predicted. There is no story unless our attention is held in suspense by a thousand contingencies. Hence we must follow the story to its conclusion. So rather than being predictable, a conclusion must be acceptable. Looking back from the conclusion towards the episodes which led up to it, we must be able to say that this end required those events and that chain of action.

It is this kind of intelligibility of the process that we can aspire to in trying to understand complex orders. If we implicitly identify all scientific explanation with the standards applicable to understanding mechanisms, we will never see anything "out there" in the universe but the relatively timeless and simple mechanisms. For example, we will not see ourselves or our accomplishments. When we can find only cold mechanism in nature, our own creative achievements in science and elsewhere appear to us as inexplicable mysteries.

A machine is understood when it is fully under the control of its user. A philosophy that sees everything as a machine will naturally put the idea of control at the very center of its view of reason and science. By contrast, spontaneous order analysis prefers a notion such as cultivation. A spontaneous order is not designed and never really under our control, since it evolves according to a logic all its own. This does not mean, however, that we are utterly helpless to exert influence over the workings of such ordering processes. Its order may be intelligible in terms of general principles, and these principles may well show us that some environments are more conducive to its self-ordering process than others. Understanding a spontaneous order may enable us to tailor the general conditions for its flourishing. But if we persist in trying to control the detailed working of this kind of process, we are more likely to interfere with its own logic and obstruct its self-ordering, than to intelligently "guide" it in any sense. Attempting to control a spontaneous order is like trying to fix a complex machine, whose detailed workings we do not know, by throwing a monkey wrench at it.

The socio-political consequences of modernism's view of knowledge as control are suggested when we consider that other people are part of what we want to know about. The more the modernist

view of science advances into the human sciences, the more threatened we find our freedoms. The modernist notion that understanding something means controlling it leads to the attempt to control our own society as we might control a machine we built ourselves. Social engineering in turn has led not only to a loss of freedom for those not in control of the social “steering” mechanism, but, to the surprise of many, it has led to a loss of social order. The great paradox of modernism is that while born in the aspiration of freedom and control over our world, it has brought us now to a position where we seem to have neither. The more bold and ambitious the attempts to control our world, the more irrational “chaos” we seem to generate, and the less freedom we seem to enjoy.

Scientific Socialism: Old and New

For more than half a century the belief that deliberate regulation of all social affairs must necessarily be more successful than the apparent haphazard interplay of independent individuals has continuously gained ground until today there is hardly a political group anywhere in the world which does not want central direction of most human activities in the service of one aim or another. It seemed so easy to improve upon the institutions of a free society which had come more and more to be considered as the result of mere accident. . . . To bring order to such a chaos, to apply reason to the organization of society, and to shape it deliberately in every detail according to human wishes and the common ideas of justice seemed the only course of action worthy of a rational being.

—F. A. Hayek ([1935b] 1948, p. 119)

In many respects Marx’s critique of capitalism already involves an embryonic critique of modernism. It points to a vision of a society where persons are treated as beings in control of their own lives rather than resources to be manipulated by others. Marxism might even lay claim to being the first systematic attempt at a social critique of modernism. Philosophically it contains suggestions of the radical significance of time and genuine novelty in its dialectical approach. Economically it is concerned with disclosing the dynamic and historical forces of social change and not some fixed, eternal structure. It contains a vigorous critique of the attitude of naturalism and insists that there are profound methodological consequences from the fact that in the social sciences man studies himself and not an alien objective world. It condemns bourgeois ideology for its failure to dig beneath the simple and static appearance of social reality and to see the more complex and dynamic processes going on in society. In these and other respects Marxism can be said to be a social theory

that is in the spirit of the new view of science, indeed amazingly so in light of when it was first developed.

But Marx and his followers in the late 19th and early 20th centuries could not have anticipated the momentous transformation of science that has taken place by now. Orthodox Marxism implicitly retains many elements of unmistakably modernist thinking, and I would like to argue that it is these very elements which have led to the main difficulties in this century's experiments with socialism. I will focus on the central theme by which Marx engages in a radical critique of capitalism: his analysis of its chaotic and undemocratic form of organization. The ultimate emancipatory goal of Marxism, to build a more rational and more democratic society, is inhibited by defects in the critique of capitalism, and the new conceptions of science enable us today to find a way to correct these defects.

The point of correcting what I consider defects in the traditional Marxian critique of capitalism is not to try to rescue historical capitalism from the critique, but to help reconstruct a better alternative to both historical capitalism and socialism. I would not deny the fact that there are serious difficulties in the way state capitalism works, for example, in the recurrent business cycles, stock market crises, unemployment and inflation problems, and so on.⁶ Of course historical socialist regimes have their own share of difficulties, but contemporary socialists have good reasons not to want their reforms to aim at nothing better than what historical capitalism has accomplished. My purpose here is not conservative but radical. I want to explore how we might update the critique of capitalism in such a way as to improve our vision of an alternative to both it and the versions of socialism we have seen so far.

It is well known that Marx said little directly about how socialism was supposed to work, and he devoted his attention to a critique of capitalism. This procedure is misunderstood if it is taken as an opportunity to freely invent any model of socialism, however foreign to Marx's own way of thinking, and graft it onto his critique of capitalism. The critique of capitalism is not an alternative to the study of socialism but a means of conducting that study. Implicit in the critique is a vision of a society that transcends the problems the critique identifies with the capitalist system. If Marx's critique of the capitalist

⁶I would argue that attempts to centrally control the money supply are responsible for introducing unnecessary chaos into the market process, and that those relatively rare instances in which money and banking were left decentralized and unregulated are also among the most orderly episodes of modern economic history. See White (1984) for a discussion of the experience with relatively unregulated money and banking in Scotland in the early 19th century.

system needs revision today in light of our new views of science, so must our vision of the alternative system.

While I consider it a perfectly legitimate analytical procedure to develop a vision of social change indirectly by way of a critique, there are likely to be costs to this approach.⁷ It is hard to see how socialist institutions might work when they are not “thematized” specifically. I believe that one result of this lack of attention to the institutional details of socialism is a serious tension in Marx’s implicit vision of the socialist society, a tension that suggests there is room for some *re-vision*.

Marx was on the one hand asking us to conceive a form of democracy more extreme than advocates of capitalist democracy can usually imagine, a democracy in which the basic direction of social change is a topic for all members of society to have their say about, and thus the form has a radically decentralized character. This aspect of Marx’s work is most vivid in his earlier and more philosophical writings. On the other hand he was suggesting that this democratic process should culminate in society settling on a common plan by which the entire economy is to be ordered, and thus the vision has a radically centralized character. The centralized aspect is suggested more strongly in Marx’s later and more political-economic writings, and especially in his critique of market institutions as “anarchic.”

In his economic critique of capitalism Marx charged that this form of social organization was an “anarchy of production,” a system of organization that was “out of control.” He was not denying that this system exhibits some degree of orderliness, indeed his whole analysis of the theory of value is an attempt to describe the order that does emerge in this system. But he stressed that the order that arises is brought to the system only haphazardly in the form of periodic crises, which forcefully correct for the disorder that continuously accumulates throughout the system.

The orthodox interpretation of Marxism seeks to correct the undoubtedly chaotic difficulties of historical capitalism by means of a wholesale rejection of market institutions, prices, money, and the profit and loss system. If the whole productive system is to be taken

⁷I have used this procedure myself in my critique of national economic planning (1985b), which was really aimed at a reconceptualization of the nature of a free-market society. I am convinced that it is often necessary to approach one’s ideal society indirectly by developing a critique of the features of modern society that one would like to overcome. One should still try to get around eventually to a more constructive institutional analysis, however. Advocates of free-market institutions, like advocates of socialism, might do well to spend more of their time directly on how their proposed ideal institutions might work, and less on deconstructing the ideals of one another.

over and rationally controlled, then it will not do to permit isolated agents in the economy to act on their own initiative and spend their cash balances wherever they please. It will not do for investments to flow haphazardly in whatever direction profits attract them, regardless of the (democratically decided) plan. It will not do for competitors to struggle against one another for these profits under risk of losses, to bid prices up against one another on the demand side, or to bid them under one another on the supply side. The price system does work as an ordered anarchy, and it seems reasonable—at least for a modernist—to visualize its radical alternative as a system that dispenses with all this chaotic competitiveness and brings the diverse projects of separated decisionmakers into a unity under a common plan.

Marx did occasionally suggest that the way to overcome this chaotic system was to bring the socio-economic system as a whole under the deliberate control of “the associated producers.” He used the phrase “dictatorship of the proletariat” (which includes, at the moment of revolution, not just one social class, but virtually the whole of humanity) in an ironic way, which certainly hints at centralized control, but also suggests that somehow everyone would participate democratically in this plan. This approach, like most of Marx’s allusions to how socialism might work, is tantalizingly ambiguous. The idea of bringing the whole economy under the control of somebody sounds like extreme centralization, yet the phrase “associated producers” suggests a radically decentralized and democratic form of organization.

Unfortunately, Marx’s ambiguous vision of socialism has historically been elaborated in a one-sided way that makes it nothing more than a system of hierarchical central planning. In Lenin’s words socialism is organized as a “democratic centralism.” That is, a democratic process would first take place by which the goals of society would be determined, and then these goals would be translated into a general plan that would design economic production as if it were a single, gigantic engineering problem. Once the plan was settled, there would be no room for democratic differences. If the society was to be organized “rationally,” the plan must be obeyed diligently.

This centralized interpretation has the advantage that it fits well with some of Marx’s economic writings, especially his wholesale condemnation of market institutions, but it has the disadvantage that it fails altogether to fit Marx’s political vision of human beings in control of their own lives. Centralized economic planning on the orthodox socialist model has been a complete failure in the democratic dimension, and this failure has spawned a renewed focus within the Marxist tradition on the decentralized aspects of Marx’s vision.

Within the Marxian tradition there are powerful intellectual currents that constitute a critique of the social-engineering view of politics that comes from the orthodox Marxists.⁸

Spontaneous Order and the Critique of Orthodox Socialism

That we have been able to achieve a reasonably high degree of order in our economic lives despite modern complexities is only because our affairs have been guided, not by central direction, but by the operations of the market and competition in securing the mutual adjustment of separate efforts. The market system functions because it is able to take account of millions of separate facts and desires, because it reaches with thousands of sensitive feelers into every nook and cranny of the economic world and feeds back the information acquired in coded form to a "public information board." What the marketplace and its prices give most particularly is a continuing updating of the ever changing relative scarcities of different commodities and services. In other words, the complexity of the structure required to produce the real income we are now able to provide for the masses of the Western World—which exceeds anything we can survey or picture in detail—could develop only because we did not attempt to plan it or subject it to any central direction, but left it to be guided by a spontaneous ordering mechanism, or a self-generating order, as modern cybernetics calls it.

F. A. Hayek (1976, p. 237)

The most important critique that has been raised by economists against the traditional, centralized view of socialism is the challenge

⁸I am thinking of the Frankfurt School of Marxism, and particularly its contemporary leader Jürgen Habermas, whose work on the idea of a communicative ethic involves a radical critique of the modernist view of rationality, and of its corollary, the social-engineering view of politics. See, for example, Habermas's essay "Dogmatism, Reason, and Decision: On Theory and Praxis in Our Scientific Civilization" (1973, pp. 254–55) where he writes:

The social potential of science is reduced to the powers of technical control—its potential for enlightened action is no longer considered. . . . Emancipation by means of enlightenment is replaced by instruction in control over objective or objectified processes. Socially effective theory is no longer directed toward the consciousness of human beings who live together and discuss matters with each other, but to the behavior of human beings who manipulate. . . .

Yet even a civilization that has been rendered scientific is not granted dispensation from practical questions; therefore a peculiar danger arises when the process of scientification transgresses the limit of technical questions, without, however, departing from the level of reflection of a rationality confined to the technical horizon. For then no attempt at all is made to attain a rational consensus on the part of citizens concerning the practical control of their destiny. Its place is taken by the attempt to attain technical control over history by perfecting the administration of society, an attempt that is just as impractical as it is unhistorical.

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that was first issued in the 1920s by the Austrian school economist, Ludwig Mises, and substantially elaborated by his leading student, F. A. Hayek.⁹ This critique concerns the difficulty, perhaps the utter impossibility, of rationally organizing an economy according to a central plan. The “calculation argument” is essentially an application of spontaneous order analysis to economics. The process by which order emerges in the economy is one that can be cultivated but not controlled.

The Mises/Hayek critique of socialism is well known to this day in the field of comparative economic systems and is often credited with having refuted the orthodox Marxian central planning position. I do not think it is generally understood, however, exactly *why* this centralized model fails, and as a result the alternative direction the critique suggests is also misunderstood. All too often economic reformers reject orthodox socialism only to endorse a form of orthodox capitalism that is subject to virtually the same criticism. One form of modernist thinking, one kind of social engineering, is simply replaced by another.

Properly understood, the critique of orthodox socialism is not a conservative defense of the state-capitalist systems prevalent in the West, but a basis for criticizing both traditional capitalism and socialism. The Austrians’ challenge is widely thought to have been circumvented by one or both of two standard neoclassical approaches, each of which fundamentally misunderstands the critique it is supposed to answer. The microeconomic answer reduces the problem to a matter of pure, abstract equilibrium theory and thus fails altogether to meet the practical challenge.¹⁰ The macroeconomic answer pro-

⁹The “calculation argument” was formulated, and so named, by Mises in his 1920 essay “Die Wirtschaftsrechnung im sozialistischen Gemeinwesen” and his 1922 book *Die Gemeinwirtschaft* (1936). Mises’s original essay, along with similar formulations of this argument by Halm, Hayek, and Pierson, are included in English in Hayek’s *Collectivist Economic Planning* (1935a). Hayek’s rejoinder to Lange and other relevant essays on the role of knowledge in the economy are included in Hayek’s *Individualism and Economic Order* (1948). Summaries of the debate include Armentano (1969), Hoff (1949), Lavoie (1981, 1985a, 1987b), Murrell (1983), and Vaughn (1980). For interpretations of Soviet economic experience in light of this theoretical critique, see Brutzkus (1935), Lavoie (1987a), Polanyi (1951), and Roberts (1971).

¹⁰The micro answer to the critique of orthodox socialism embodies a new model of socialism, devised by the well-known Polish economist Oskar Lange ([1936] 1964), which is supposed to consist of an ingenious combination of centralized planning with a decentralized price system. Although Lange’s answer to this argument is right insofar as it insists that socialism needs to accommodate itself to the price system, it fails to realize the implications of this important change in the vision of a socialist society. Lange thinks socialism can still be centrally planned in some meaningful sense, and he is still ready to condemn the anarchy of capitalist production for being unguided.

poses a kind of partial planning that has led to serious difficulties of inflation and unemployment throughout the Western world, for reasons the Austrians had warned about long ago.¹¹ The upshot of both of these interpretations is a simple endorsement of the idea of the "mixed economy," that is, a defense of the status quo economic systems of the West, systems that involve a substantial mixture of markets and state intervention.

I would like to suggest that this complacent defense of interventionism is due to a confusion that is rooted in the very philosophical prejudices I have been calling modernism. Interventionism does not represent either an advancement over traditional Marxism or an effective answer to the Mises/Hayek critique of centralized planning. Thus I would like to offer my own interpretation of this classic critique in order to show both how it represents an instance of spontaneous order analysis and how it points not in a conservative but in a radical direction for economic reform.

The problem the calculation argument raises for the economics of socialism can be described as an application of the new view of science to the study of economic institutions. It depicts these institutions as working in a self-organizing way, establishing order by means of apparently disorderly processes. The argument emphasizes that the production process is fundamentally complex and that its adjustments take place through time by way of irreversible, evolutionary processes.¹² And it is central to the argument that what makes the "structure" of production hang together is the *meaning* that gets conveyed through the price system. The goods produced in the economy are not viewed as objective, physical things, but as intimately connected to human subjects and their purposes.¹³

He has essentially reverted to a conservative defense of interventionism, to a policy of state interference into a market-organized economy. His market-socialist model manages to reconcile planning with markets only by failing to deal with the real problem the critique raised about socialism in the first place. The Langean world is based on the perfect competition equilibrium model from Walrasian economics, and as such fails to grapple with the complexity of the real economy, or with the existence of uncertainty in economic decisionmaking. He depicts the economic problem as if it were a matter of monologically performing an objective calculation, instead of dialogically discovering subjective meaning.

¹¹The ideas about "fine-tuning" the economy by management of the money supply and fiscal policy, which have come to be known as Keynesian, were vigorously criticized by the Austrian economists at the same time as they were formulating their critique of orthodox socialism, and for similar reasons. The fine-tuners know as little about what they are doing as do the central planners.

¹²For summaries of the Austrian tradition in economics and the way it grapples with time and complexity, see Rizzo (1979) and O'Driscoll and Rizzo (1985).

¹³For a summary of the Austrian approach to economics that stresses this point about meaning, see Mises (1949).

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The Mises/Hayek critique of socialism contends that any system of common ownership of the means of production is inherently unable to generate and disseminate the scattered and largely tacit knowledge, including knowledge of the relative scarcities of various consumers' and producers' goods, upon which advanced technological production depends. Separate owners actively contending with one another for money profits are able to (undeliberately) impart knowledge to the system of relative prices, and in turn to orient their own actions by reference to their "economic calculations" in terms of these prices, in such a way as to enable the millions of independent decisionmakers to coordinate their actions with one another. Without these prices to serve as "aids to the mind," as Mises called them, the planner would not know how to organize his or her commonly owned means of production with anything close to the degree of efficiency attained spontaneously by the rivalrous workings of the market process. Thus the argument is that there is a practical problem involving the use of knowledge facing any society that attempts to deliberately (and thus non-rivalrously) plan its economic order.

Hayek's later restatements of this argument (1935b, 1935c, 1940, 1976) make increasingly clear the importance of the nature and uses of knowledge to the whole critique of socialism. The problem with centralized planning is a problem in the social use of knowledge. Participants to the market process contribute to the discovery and conveyance of knowledge by imparting their local information to prices and in turn receiving useful information from others that is digested in prices. The challenge shows why socialism cannot afford to completely abolish the price system, as orthodox Marxism intended. Prices represent vital signals that each market participant needs in order to act intelligently.¹⁴

Now if proponents of socialism take seriously Hayek's argument that the complexity of the planner's task exceeds the capacity of any single mind or organization, the natural response would seem to be to greatly simplify this complex task. Instead of trying to plan the whole economy down to its every detail, as orthodox Marxians had ambitiously proposed, a more modest planning policy might be to just plan major sectors or aggregate categories or particular aspects of the economy. Many proponents and critics of socialism in the 1920s and 1930s assumed that the Central Planning Board would actually keep track of all the intimate details of the individual organization of each factory. Such a view of comprehensive planning is

¹⁴See also Hayek's related papers on knowledge and competition: Hayek (1937, 1942, 1945, 1946, and 1978b).

implicit in the traditional interpretation of Marxian socialism, but today it seems so far from the real experience of Soviet-type economies that it sounds almost like a straw man.

The attempts, however, to withdraw from comprehensive planning to more moderate forms of partial planning, or interventionism are illusory. The appraisal of the efficacy of an economic plan can only be made in the context of a specific choice between real alternatives whose opportunity costs can be ascertained. The choices that together impart rationality to economic processes are only meaningful in certain specific contexts. It is not possible arbitrarily to separate out choices about prices from all the other aspects of choices, allocating decisions about price changes alone to the planning board. Neither is it possible for the central planners to decide on overall macroeconomic aggregates while leaving the microeconomic details to be worked out by decentralized decisionmakers. In both cases an artificial division of decisionmaking is being proposed in which the partial decision that the planners are supposed to make is in fact a meaningless one.

The planning board cannot intelligently decide on the price to charge for, say, a new computer program without detailed knowledge of the qualitative characteristics of this good and the costs of its production. For exactly the same reason, the planning board cannot decide on the total "quantity" of all computer programs needed by society without first having detailed knowledge of all the specific programs that make up this aggregate. To pretend to plan the price alone or the aggregate alone and leave the rest to others is to retreat from rational planning as the society's organizing mechanism to arbitrary intervention in a market-organized system. Thus the whole rationale of planning is undermined unless it can be shown how the planners' task could possibly be parceled out or delegated to subordinates without also relinquishing the meaningfulness of the decisions being made.

How, then, is the "intellectual division of labour," as Mises ([1920] 1935, p. 102) put it, accomplished in the market? Here each rival is able to focus his mental capacity on but a part of a complex network of economic relationships whose overall structure no market participant knows. Yet by allowing its participants to adjust their activities to one another through prices, the overall system exhibits an unintended order that makes advanced technological production possible.

The practice of accounting, that is, of the calculation of profit/loss accounts in terms of money outlays and receipts, both *ex ante* and *ex post*, has enabled human beings to orient their productive activities to one another in such a manner as to permit social production as a

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whole to be carried on with a very high degree of complexity. The calculation argument contends that in fact this complexity has, in the case of the advanced economies of the modern world, come to far exceed that which could possibly be consciously planned by any single mind or agency. By taking account of one another's decentralized plans indirectly, as mediated through relative price signals, which are continuously registering the competitive tugs and pulls of market participants, we are able to attain a complexity that is unattainable in any noncompetitive and centralized way. Thus the traditional socialist ideal of abolishing the "anarchy" of capitalist production to be replaced by central planning is impossible.

The crucial issue for Mises and Hayek was not primarily how the relative demands for consumers' goods were to be registered without competition, but rather how these consumers' goods evaluations, however determined, could be imputed through the complex network of relationships known as the capital structure. The defining characteristic of socialism throughout the period of the calculation debate was its ambition of abolishing separate ownership of the means of production. Whether we assume the state arbitrarily decides what everyone needs for consumer goods, as Maurice Dobb was to suggest during the debate, or a free market in consumers' goods was to prevail, as advocated by the market socialists, the real problem lies in translating these consumer evaluations into evaluations of producers' goods. Producers' goods prices are not "derived" logically from consumers' goods prices; they are "imputed" through a historical process of competition.

If the means of production are commonly owned, then plant managers cannot openly bid against one another for factors in the kind of competitive discovery process that imparts information to producers' goods prices in a capitalistic market economy. They cannot "play at competition" without putting their own wealth commitments at stake. It is precisely through rivalrous contention by separate and independent owners that market participants are able to impart information to the prices of factors of production, prices that in turn allow them to intelligently appraise alternative avenues of production. Thus the critique of socialism leads directly to the case for shifting the attention of economic policy from the attempt to control specific outcomes to the attempt to cultivate a system of rules in the form of "property rights."

Now there are many conservative economists who will think this critique of orthodox socialism constitutes a case for the status quo of Western economies. These economies, however, have been subjected to ambitious attempts to control them, attempts that are no

more justified than are orthodox central planning policies. Among the tools of control, for example, is the effort to control money, the very life-blood of market institutions, by means of central banking and monetary policy. Yet the very same reasons why an economy cannot be intelligently planned suggest that its supply of money and credit cannot be either. The severe problems with inflation and unemployment that plague most Western capitalist economies are not due to the fact that they have relied too much on spontaneous market forces, but rather to the fact that they too have tried to control rather than cultivate the economic order.¹⁵

Conclusion

We stand at the beginning of a great new synthesis. The correspondence of static structures is not its subject, but the connectedness of self-organization dynamics—of mind—at many levels. It becomes possible to view evolution as a complex, but holistic dynamic phenomenon of an universal unfolding of order which becomes manifest in many ways, as matter and energy, information and complexity, consciousness and self-reflection. It is no longer necessary to assume a special life force (such as Bergson's *elan vital* or the *prana* of Hinduism) separate from the physical forces. Natural history, including the history of man, may now be understood as the history of the organization of matter and energy. But it may also be viewed as the organization of information into complexity or knowledge. Above all, however, it may be understood as the evolution of consciousness, or in other words, of autonomy and emancipation.

Erich Jantsch (1980, p. 307)

Critics of the current reformers in the Peoples' Republic of China have charged that the attempt to borrow from the new view of science is merely another form of "scientism," or "science worship," which fails to leave room for the human element. They also warn that market reformers in Yugoslavia and Hungary have brought those countries a new set of difficulties, including inflation and unemployment, and that freeing up the price system necessarily implies condemning socialism to all the vices familiar to Western state-capitalist econo-

¹⁵The Austrian economists Mises and Hayek have pointed to the problems with efforts to control an economy by manipulating the supply of money and credit, and they have argued that not only inflation but also much unemployment is traceable to this policy. See Mises (1981) and Hayek (1931). For a useful overview of Hayek's work on economics that shows the common basis of both his critiques of orthodox socialism and of orthodox capitalism in his theory of spontaneous order, see O'Driscoll (1977). The contemporary work on free banking by White (1984) and Selgin (1988) is particularly important in this regard in that it shows specifically how a decentralized monetary system can be more orderly than one that is controlled by central banking policy.

mies. Both of these criticisms fail to appreciate the new synthesis that is emerging in science in general and within political economy in particular. The choice between being pro-science and pro-human is a false one, a legacy of modernist thinking that is being overcome in the new view of science. There is a third alternative that is at once humanistic and scientific. Similarly the choice between socialism and conservatism is a false one. There is no necessity that when prices are freed up problems of inflation and unemployment will result. There is a third alternative, namely, a truly free society that minimizes the overall role of government and allows the spontaneous forces of the competitive market process to produce social and economic order.

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THE IMPACT AND INFLUENCE OF THE NEW VIEW OF SCIENCE ON CHINA'S REFORM

He Weiling

Great changes have taken place since the economic system reform was introduced in China in 1978. The reform covers a wide field with different outcomes and significances, predominated by a change in the ways of viewing and ways of thinking. Professor Don Lavoie points out that today in China the economic reformers are taking "the new view of science" as their starting point.

For the last 10 years, the so-called new scientific methodology—such as control theory, catastrophe theory, and dissipative structure theory—was introduced progressively and extensively to the study of social science and greatly enlightened people's outlook and thinking. This change is the result of China's reform on the one hand and the driving force for the reform on the other hand.

The significance of the new view of science, or rather the new way of thinking, is profound. It is a powerful tool that helps us in analyzing the issues concerning social-economic development and reform, and it makes people's way of thinking more identical and practical—especially as it creates a condition for the dialogue between policy-makers and young researchers. On the other hand, the new scientific methodology is also an appropriate way to deal with, to combat, to eliminate, and to renovate the traditional and classical dogmatism.

The new view of science—the new way of thinking—has been applied throughout all the processes of the reform, during which the reform has been penetrating into every corner of the society for the last 10 years.

In consideration of the nature of Lavoie's paper, I will focus my comment on two subjects: (1) the implications of the new view of

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science for China's reform, especially the new view of order and chaos, and (2) a review of China's reform over the last 10 years in light of the new view of science.

A New View of Order and Chaos

The new view of science, as Lavoie points out, adopts a new category of order and chaos. In turn, this change gives rise to a very important perspective in exploring and analyzing social-economic development and social-economic laws in terms of order and chaos. The new view explains especially how the social and economic order develops.

The old way of thinking exaggerated and overemphasized Marxist criticism of the capitalist market economy, overlooking the decisive role the market mechanism plays in economic development. As such, the old view led to state-monopolized planning. When Newton's way of viewing the world was universally acknowledged, all laws (both natural and social) were regarded as absolute, and no one could change them. Adversely, the old view overlooked the importance of human knowledge and reflection; it did not recognize that the participation of human beings in the social-economic process will influence their perceptions as they learn and acquire new information.

The old way of thinking has served as the philosophical basis for the theory of comprehensive planning. As a result, like all socialist countries, China made a detour on its way to economic development, during the founding of the new China, because of the theory of comprehensive planning.

Two Kinds of Order

According to the new scientific view of Prigogine's theory (dissipative structure theory), there are two kinds of order: ossified and alive order. The planning order actually belongs to the ossified order that cannot meet the need of rapid development, which depends on an efficient division of labor and intelligence and on the incessant emergence of new technology and new productivity. Therefore, the planning order is only a primitive order in accordance with a simple economic system.

The centrally planned order will totally collapse in the progress of new technological development and new social subdivision of labor and intelligence. The chaos arising from excessive central planning is self-evident, and has been especially visible during the progress of China's economic reform. And to make matters worse, the planning system could do nothing for resolving the chaos problem by eco-

conomic means because it could not regulate automatically; that is, under central planning there is no spontaneous self-organizing process. So every time chaos arose, only political movements followed. (In this sense, the question addressed in Lavoie's recent book *National Economic Planning: What Is Left?* is clearly relevant.)

The Problems of Knowledge and Democracy

According to Lavoie, there are two problems that the planning system cannot solve: the knowledge problem and the democracy problem.

As to the first problem, it is not the lack of information, per se, that leads to the ill-practice of planning. It is because the planning system does not align itself with the drive for modernization. Under the planning system, the plan is made by a small number of people or organs. It therefore cannot perform in the same manner as a highly integrated mechanism. Under the planned economy, it is difficult to make any new adjustment and allow for new economic activity. The adjustment problem can be solved only by introducing a market mechanism that can automatically and spontaneously adjust itself by using all kinds of economic measures, including competitive prices, a stock market, and a bond market, as well as by introducing sound monetary and fiscal measures. By doing so, a type of collective social intelligence can replace individual intelligence and the social-economic structure could be transformed into a new order, a higher-level order that can stand the test of time.

One point needs to be emphasized: The market mechanism is not only a key measure for maintaining the balance of demand and supply, but also an important measure for promoting the transformation of the economic system from a lower level of integration to a higher level.

The second problem, the problem of democratic rule, is very clear. Under the old planning system only a small group of people, operating in a hierarchical way, administer and manage the system. Such an arrangement will undoubtedly brew and produce a cumbersome and ossified bureaucratic system.

Theoretically and practically, the establishment of a market-oriented economic system is the prerequisite for modern economic development. This conclusion is quite obvious from the process of the reform as well as from the new view of science, including the concept that the formation of a highly self-adaptive and self-regulating social structure stems from the opening of the system.

China's Reform Process

The second subject I would like to touch on is a review of the history of the last 10 years of reform.

For the last 10 years, newly born ideas were often subject to much criticism. New ideas always take shape along with any reform drive. New ideas also serve as a pathbreaker for changing and developing an economic system.

During China's reform process over the last decade, there were three stages in the development of the new way of thinking about and viewing economic organization. First, those who accepted the new view of science would not question classical dogmatism directly. They avoided any confrontation with orthodox views, and only advocated a new scientific method, applied new concepts, new technology, and new ways of expression. In the second stage, advocates of the new view reassessed and challenged the analysis of the classical theory of Marxism. Finally, in the third stage, which is now just beginning, there is an open discussion of the market order, ownership, and the role of a stock market in China's socialist system.

Cultivating a Spontaneous Order

Another important concept offered by Professor Lavoie is "cultivation." When we regulate the economic system, cultivation is better than control. In the process of undertaking reform, policymakers should keep two concepts in mind: graduation and cultivation. In that process, the most important thing is not control but cultivation.

We have to liberalize and cultivate but not control the social economic realities in light of the application of laws and principles of economic development by means of the new view of science—using the new concept of spontaneous order, the new methodology, and the new terminology. Only by openly acknowledging the spontaneous and self-organizing process can we fully understand and accept the basic laws in our way toward a higher social-economic order. Otherwise we will be thrown back into chaos and suffer another big setback.