The Economics of Time and Ignorance: A Review

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This is a very difficult review for me to write, for my overall assessment of *The Economics of Time and Ignorance* is strongly negative. Jerry O'Driscoll got me started in Austrian economics, and I have over the years learned much of value from him. Both he and Mario Rizzo have excellent track records of significant contributions to the revival of the Austrian school in the 1970s and 1980s, and I am certain they will make such contributions in the future. The present book, however, is not such a contribution. In it the authors make much of the distinction between typical and unique features of events. Regretfully, the book is not typical of the authors' work, and its problems, as I will relate, are quite unique.

The dust jacket of the book calls it:

> The first contemporary account of [the Austrian school's] foundations. In it [the authors] present an integrated view of its themes and make an original contribution to our understanding of uncertainty and dynamic processes.

In the acknowledgments, the reader is told that the book was originally conceived as an exposition of standard contemporary Austrian school economics. It was to be an extension of the paper "What Is Austrian Economics?" the authors delivered at the 1980 American Economic Association meeting. Most Austrian economists who knew that the book was being written expected that it would be precisely that; and most of them, especially this reviewer, looked forward to having just such an authoritative exposition available to open-minded neoclassical economists and for their own classroom use.

If the authors had stuck to their original intentions and focused their energies on producing a lucid exposition of standard Austrian theory together

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The Economics of Time and Ignorance by Gerald P. O'Driscoll, Jr., and Mario J. Rizzo. Oxford and New York: Basil Blackwell Ltd., 1985.

with clear and convincing illustrations setting out the many advantages of the Austrian perspective over the dominant neoclassical orthodoxy, they would have indeed advanced the Austrian resurgence. But they fell prey to the temptation to focus on what the dust jacket calls their "original contribution." As they put it at the beginning of chapter 1, they came to feel they had to "go beyond" standard Austrian theory.

That was a most unfortunate decision. Economists are all much the worse for it. They should have saved the original contribution for a separate book, for in their attempt to do both tasks in one volume they offer many confusing expositions of standard Austrian economics, and they present a most unconvincing case in support of their original contribution.

The first five chapters of the book are devoted to theory, and the remaining five chapters discuss applications. Chapters 7–9 are the best. Here the authors exposit standard Austrian theory unencumbered by their original contribution. Chapters 4–6 are the worst in the volume. Here the authors seem literally to strain for originality. In so doing, they suggest spurious distinctions between standard Austrian theory and their own approach, and they discuss the work of Hayek (and, to a much smaller extent, of von Mises and Kirzner) in a misleading and confusing way.

It soon becomes apparent that the key ideas in their original contribution involve several distinctions hitherto unknown even to Austrian economists. Two such distinctions are introduced in chapter 1, "An Overview of Subjectivist Economics"—the distinction between static subjectivism and dynamic subjectivism, and between static (or Newtonian) time and real time. Since these distinctions are novel even to Austrian economists, it behooves the authors carefully and clearly to set out their points right from the beginning. They do not.

To an Austrian, the subjectivist nature of economics refers to the fact that economics is about the formulation and consequences of the plans and actions of people as they attempt to do the best they can for themselves within a context of imperfect information and scarcity. The focus of attention is on the subjects, not the objects, of human action. Each individual's plans and actions are formulated on the basis of perceived costs and benefits. Both costs and benefits are subjective. That is, they both have whatever significance the individual's mind attaches to them. Neither costs nor benefits are objectively observable or measurable by third parties. As the authors phrase it, "for the Austrians, and for subjectivists generally, economics is first and foremost about the thoughts leading up to choice, and not about things or objective magnitudes" (p. 2).

So far, so good. But then the reader is told that there are two kinds of subjectivism—static and dynamic. No explanation is offered. The reader is simply told that "[s]ubjective probability . . . reflects subjectivism in its static form; while unbounded possibility sets reflect the essentially dynamic aspect of subjectivism" (p. 4).

Neoclassical models typically handle uncertainty by positing the existence of known probability distributions of possible future events. Austrian economists have long argued that such known probability distributions merely replace one version of the perfect knowledge assumption with a more sophisticated version of the same assumption. In the real world, however, there is genuine uncertainty. As Frank Knight long ago pointed out, not even the probability distributions are known; that is, in the words of the present authors, human action takes place within the context of "unbounded possibility sets."

That is fine, but it is nothing new. And it certainly is insufficient justification for creating a hitherto unknown distinction between static and dynamic subjectivism. An Austrian, to say nothing of a neoclassical economist, is left bewildered. Perhaps, however, the authors' intent is to whet the reader's appetite for chapter 2, "Static versus Dynamic Subjectivism."

Austrian economists have also long objected to what they perceived to be an abuse of time in much neoclassical analysis. In that analysis, time is represented by t and treated as a mathematical variable, different values of which can be plugged into mathematical equations. The analyst assumes a godlike posture of comprehending all time—past, present, and future—at once, usually as positions along an axis labeled t. The past can be retrieved at any instant by picking a value of t that represents the past and plugging it into an equation. Similarly, the future can be realized at any instant by picking a value of t that represents the future. From the perspective of the present, the future already exists in determinate form. It merely has to be reached as another place on an axis. Functions are even held to be continuous and at least twice differentiable in t.

In reality, of course, time is not an objective entity that can be treated as an independent variable in a function in the same way that own price is treated as an independent variable in a demand function. Time exerts no influence in its own right in economic transactions. It is what people do in time, including the contracts they enter into that involve the elapse of specific periods of time, that influences economic transactions. Time is subjectively experienced by each individual as, in the words of the authors, "a flow of events." The future does not already exist to be reached; the future becomes what it is as the result of actions taken in the present. Since those actions are indeterminate, so too is the future. Real time is merely time treated as it is actually experienced and as it actually enters into individual decision making. Static or Newtonian time (time treated as an independent mathematical variable) is artificial and can shed no light on the formulation and consequences of human action. Such is standard Austrian fare.

But the present authors again bewilder the reader, especially the neoclassical reader, by stating that when time is conceived in purely static terms, it is "analogized to space: Just as an individual may allocate portions of space (land) to certain purposes, he can also allocate portions of time to certain activities"

(p. 3). Do the authors mean to suggest that people do not allocate time in that fashion? Economists of both the Austrian and neoclassical varities surely will object. I, for example, have allocated a specific period of time to writing this review. But here again, perhaps the authors merely intend to whet the reader's appetite for chapter 4, "The Dynamic Conception of Time."

Contrary to reasonable expectations generated by its title, chapter 2 does little to clarify the distinction between static and dynamic subjectivism. The reader is reminded that the subjectivist realm is that of "purposes, plans, valuations, and expectations" (p. 18). Then static subjectivism, the kind that "is most closely related to the traditional subjective theory of value," is explained as that approach in which "the mind is viewed as a passive filter through which the data of decisionmaking are perceived" (p. 22).

Now, if one interprets "the traditional subjective theory of value" to mean the neoclassical model of Hicks et al. with its ordinal utility, indifference curves, and budget constraints, one is led to think that "static subjectivism" refers to decision making within a given and fixed means–ends framework. That view seems to fit in well with the authors' explanation of dynamic subjectivism which "views the minds as an active, creative entity in which decision-making bears no determinate realtionship to what went before" (p. 22). This could be taken as a roundabout way of saying that the means–ends framework itself is constantly changing as individuals' beliefs, knowledge, and perceptions change. If that is what the authors mean, "dynamic subjectivism" is the subjectivism of the standard Austrian analyses of Carl Menger, Ludwig von Mises, Friedrich A. Hayek, Israel Kirzner, Murray Rothbard, and others.

But that cannot be. The authors must intend something else by "dynamic subjectivism." They go on to say that static subjectivism is akin to the covering law model of scientific explanation of which von Mises's "apodictic praxeological theorems" are suggested as examples (p. 23). Von Mises, then, does not qualify as a dynamic subjectivist. But von Mises's praxeological theorems are "apodictic" only in the sense that as deductions from axioms they are implicit in the axioms. There is nothing in von Mises that says that decision making is preordained or predetermined by what went before. So what *is* "dynamic subjectivism"? No clear answer can be found in chapter 2, or in the rest of the book.

The confusion does not stop there. On pp. 22–27, the authors discuss the nature of explanation and prediction in economics. The trouble is that they switch back and forth between explanation and prediction without giving the reader any warning. In so doing, they implicitly subscribe to the "symmetry thesis" of covering law models—explanation and prediction are exactly the same, except temporally.

But surely explanation and prediction are *not* the same. Some event happens, and an analyst wants to explain it. In order to explain it completely, the analyst would have to know all the antecedent conditions and all the relevant

chains of cause and effect that gave rise to the event. Such is, as the authors convincingly demonstrate, impossible. Even neoclassical economists deny the possibility of explanation in such a radical sense. The best that can be done is to come up with an explanation that makes the event more intelligible than it would be without that explanation. Prediction, on the other hand, as long as it is limited to what Hayek calls "pattern prediction," is not only possible, it is a major part of standard Austrian analysis. For example, from the action axiom (a covering law) and scarcity (a pervasive antecedent condition), it is possible to predict that there will, ceteris paribus, always be an inverse relationship between own price and quantity demanded. The "pattern" is the inverse relationship. Precise quantitative prediction of a particular instance of that pattern is, an Austrian economist would say, impossible because of the impossibility of being certain the ceteris paribus conditions hold.

The authors' discussion is at best a confusing and misleading exposition of the standard Austrian critique of neoclassical methodology. Austrians hold that explanation and prediction in economics are not, and cannot be, the same as what positivists assert they are in the natural sciences.

The chapter concludes with a section entitled "Relationship between Static and Dynamic Subjectivism" which, on its own, is clear and informative. Unfortunately, it seems to be unrelated to the rest of the chapter. According to this section,

> The static subjectivist view is that four factors determine choice: (1) the ordinal ranking of goals or wants, (2) knowledge of the relationship between courses of action . . . and want satisfaction, (3) knowledge of prices, and (4) knowledge of the income constraint (p. 28).

This corroborates my earlier interpretation of static subjectivism. It is the neoclassical approach to value theory.

Dynamic subjectivism, in addition to applying a more thoroughgoing subjectivist interpretation to the foregoing four factors, recognizes a fifth: "What an individual decides to do depends, in large part, on what he expects other individuals to do" (p. 29). Since such expectations are never held with certainty, good models of choice cannot be deterministic. This corroborates my earlier suspicion regarding dynamic subjectivism. It is the subjectivism of standard Austrian economics.

Chapter 3, "Knowledge and Decisions," is fairly clear and helpful. It points out that the knowledge problem in economics is never the acquisition of a fixed stock of information. There is in human action a continual increase in knowledge. There is no equilibrium stock of knowledge. Knowledge is divided up and distributed unequally among economic actors; because different people face different problem settings, different people will not ultimately learn the same things. Knowledge is communicated between transactors by prices (both

equilibrium and disequilibrium prices) and by institutions. All of this is standard Austrian (mainly Hayekian) fare, and the authors exposit it well.

Their best exposition comes in the chapter's last section, "Subjectivism as Weighing of Alternatives." It summarizes many of the points made by Buchanan in *Cost and Choice* on the subjective nature of costs, pointing out that Marshall was wrong when he claimed that demand is subjective and cost is objective. Both blades of the Marshallian "scissors" are subjective categories. The authors also construct a helpful schematic to illustrate "a thoroughly subjectivist view of value theory" (p. 46). They carefully distinguish (1) between commodities and projected want satisfaction and (2) between projected and realized want satisfaction, pointing out that in the static neoclassical approach to value theory, all three of these collapse into one.

I have only two complaints about chapter 3. The authors correctly say that learning in the real word is neither deterministic nor random, but something in between. They note that in the "in-between" view, the analyst asserts a priori that learning does take place, and then they say:

> Second, given the overall context of a change in knowledge, we can show how the move from framework 1 (F1) to framework 2 (F2) is intelligible, in the sense that a metatheory can be constructed in which a loose dependency on F1 is shown. F2 is more likely (though not necessarily highly likely or probable) given F1 than it would be given some other $F1_9$. On the other hand, we might say that, given F1, many possible alternative frameworks can be ruled out and that only a class of subsequent frameworks (which includes F2) can be determined (p. 38).

All that seems to mean is that perceptions tomorrow are, affected by perceptions today, but to different degrees depending on the circumstances at hand. Why the authors choose to dress up this obvious point in the formalistic garb of mathematical symbols and language is a puzzle. As Austrians, they surely realize that no analytical progress is ever made by converting plain English into mathematics which then must be restated in English to be comprehended. Could it be that the authors' intent here is merely to appeal to the prejudices of possible neoclassical readers?

My second complaint in this chapter is a recurring one throughout the book. In discussing Hayek's notion of institutions as routine courses of action that embody efficient adaptations to the environment, they point out that one problem with such a "Darwinian" view is that "[s]ome clearly inferior routines must be maintained in order to permit those clearly superior (but dependent) to exist" (p. 40). It would have been most helpful if they could have illustrated this proposition. No example is given. The point is, in the abstract, interesting and (I think) novel. Its validity and usefulness are another matter. Only a good example from the world of economics would convince me of its value. I shall refer to other instances of missing or unhelpful examples in other chapters.

Chapters 4 and 5 present the theoretical core of the authors' original contribution. They are key chapters, for if the analysis therein fails, there is nothing to their original contribution; and, inasmuch as the authors' exposition of what is standard Austrian analysis is, at least until chapter 7, so confusing, most of the book then fails.

Chapter 4 begins with a very good exposition of what is wrong with the standard uses of time in neoclassical models. It would have been better, I think, to refer to the static uses of time as "neoclassical time" rather than "Newtonian time," for the latter suggests that more is at stake than the misuse of time in economic analysis. But that is a quibble. The last subsection of their discussion of Newtonian time, "The Measurement of Time" (pp. 58–59), is dressed up in mathematical garb and is very difficult to understand; but it adds nothing to their argument, so little is lost.

The meat of the chapter is found in pages 59–67. Here it is explained that real time—or the authors' "dynamic conception of time"—is time as it is experienced by the economic actors whose plans and actions are what economics is all about. For every economic actor, each present moment is connected to the past by memory and to the future by expectation. The future can never be known with certainty; it can only be anticipated. Moreover, the anticipation cannot be in the form of a complete list of all possible future events weighted by known probabilities of occurrence. The probabilities themselves are unknowable, and any list must be incomplete.

Consider the following statement (which is not a direct quote from the text): "A transactor's expectations of the future are changed as his present knowledge changes." The statement seems to be correct. However, suppose that the change in his present knowledge is merely that what had hitherto been only expected is now fact (that is, an expectation is ratified by experience). Would that change in present knowledge necessarily alter the transactor's already existing expectations concerning that which has not already happened? For example, suppose that yesterday I expected the annual inflation rate for the coming two days to be 10 percent, and that todays inflation rate *is* 10 percent. Would my expectation of tomorrow's inflation rate necessarily change? I do not see why it must. I do not see how the authors can conclude that the passage of time *necessarily* changes expectations, and thus *necessarily* always changes the plans and actions of economic agents. Yet a very important part of what the authors later claim is their original contribution—their idea of unavoidable endogenously generated forces which preclude equilibrium—rests on that conclusion.

Consider the following direct quotes from the text:

> As we contemplate a course of action and project its consequences, we [must?] continually refine and refocus our tentative plans (p. 63).

> In the process of acting . . . the individual experiences things. These experiences are novel if only because he approaches the world from subjective

> standpoints [necessarily?] continually change by the memory of what has been occurring (p. 63).
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> [G]rowth in the stock of experience [necessarily?] leads, via growth in the stock of knowledge, to alterations in both memory and expectations (p. 64).
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> Real time is important because in the course of planning and acting the individual acquires new [necessarily unanticipated?] experiences. These new experiences then [must?] give rise, in a non-deterministic way, to new knowledge. On the basis of this new knowledge, the individual [necessarily?] changes his future plans and actions.Thus the economic system is propelled by purely endogenous [and necessarily disequilibrating?] forces (p. 64).

If each of the bracketed questions I inserted in these quotes is answered in the negative, the quotes are reasonable and can be used quite effectively in the argument against the standard neoclassical treatment of time. In some passages this is what the authors do. However, the authors also seem strongly to suggest that all of the bracketed questions should be answered in the affirmative. And on those grounds, they later seem to assert, there is no tendency to equilibrium in real world markets.

In chapter 5, "Uncertainty in Equilibrium," the authors demonstrate that equilibrium in the standard neoclassical sense (Walrasian general equilibrium as formalized by Arrow and Debreu, as well as Marshallian partial equilibrium) is logically flawed and totally irrelevant to any real world economy. For that they deserve applause. However, from time to time—although it is hard to be sure—the authors also seem to suggest that *any* concept of equilibrium must be logically flawed. They seem to flirt with the adoption of the extreme view of Shackle on equilibrium—namely there is no reason to think that there exist any systematic tendencies toward coordination or equilibrium in real world economies.

They do not adopt that view wholeheartedly for, as they correctly say, "some idea of equilibrium is important. Indeed it would be difficult to imagine a viable economics without one" (p. 71). Von Mises would replace "difficult" with "impossible" because, as he points out in *Human Action*, if there are no systematic tendencies toward coordination in an economy, an economist can derive no general principles of economics at all. Economists would be reduced to writing ex post descriptions of actual events on a one-by-one basis and methodological essays proclaiming that economic theory is impossible.

Moreover, the authors say that while "the endogeneity of uncertainty in real time" is incompatible with "standard notions of equilibrium" (p. 72),

> A suitably reformulated equilibrium construct can be consistent with our real-time framework, and can also be the analytical source of the uncertainty and endogenous changes that pervade market processes (p. 71).

They name their reformulated version of equilibrium "pattern coordination" (p. 72). So the authors apparently do not want, as Shackle does, to rule the

whole idea of equilibrium out of order. They just want to do away with "standard notions" of equilibrium.

Hayekian equilibrium—plan coordination, the notion that most Austrians consider useful—is one of the standard notions to be done away with. Consider the following quotes taken from subsections "Equilibrium as Exact Coordination" and "Inadequacy of Exact Coordinaton," respectively:

> Austrians generally follow Hayek in thinking of equilibrium in terms of compatibility of individual plans (p. 80).

> Hayek's avowed intention in developing his concept of equilibrium as the consistency of individual plans was to marry time and equilibrium. Since plans are forward-looking, he reasoned that plan coordination must entail time. Unfortunately, he did not fully understand the distinction between the Newtonian and real-time constructs. Hayekian equilibrium incorporated only Newtonian time (p. 81).

I am aware of nothing in Hayek's work that even remotely suggests that he ever treated time as it is treated in the standard neoclassical models. Hayek was always mindful that it is what people do and learn during the passage of time, not the passage of time itself, that matters. Hayek has never been guilty of the mathematical abuse of time customarily found in neoclassical analyses.

Remember, the authors' whole idea of "real time" is that the present is connected to the past by memory and to the future by anticipation. As time goes by, expectations are confirmed or falsified, and "memory swells." Thus each individual continually adopts a new knowledge perspective from which to view the unknowable, but not unimaginable, future. Time is not a mathematical variable; it is experienced by each individual as a flow of events. Hayek has always treated time in this way. His notion of plan coordination is based on this view of time.

For Hayek, however, the constantly changing perspective with which transactors view the future—the process of real learning—does not mean that those transactors constantly must change their future plans and actions. If expectations are confirmed, there is nothing in the swelled memory of the changing perspective to force plans and actions to change. Indeed, the process of approaching plan coordination involves the gradual changing of expectations and perceptions until mutually consistent plans are formulated. When that happens, transactors will no longer learn anything that forces them to change their expectations, plans, and actions. That is Hayek's plan coordination.

There is a second, closely related, Hayekian notion—pattern prediction—involved in the authors' exposition. Hayek's point here is simply that economic science can never generate precise quantitative predictions of future events. Although complete detailed descriptions of future events are beyond the reach of economics, the prediction of important qualitative, common characteristics of

a class of event is possible. For example, economics can make the prediction that effective price ceilings will all share a common (typical) feature—they will all cause shortages. The detailed quantitative description (the unique attributes) of any specific future instance of effective price ceilings cannot be predicted.

The authors sometimes seem to recognize that Hayek's notion of pattern prediction is consistent with their reformulation of the idea of equilibrium, but sometimes they do not. In chapter 4, they say that Hayek's pattern prediction "echo" their insight that "[t]heories of complex phenomena can be expected to predict only the overall pattern of outcomes . . . rather than the exact outcome" (p. 66). Yet in chapter 5 they assert that:

> The inadequacy of exact Hayekian equilibrium for the analysis of processes in real time means that we are faced with two alternatives: either (1) revise the equilibrium construct so as to incorporate time and uncertainty, or (2) abandon equilibrium altogether. . . .
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> The only feasible alternative is to revise our notion of equilibrium. . . . We propose . . . pattern coordination. This makes use of both the original Hayekian "compatibility of plans" and the distinction between typical and unique aspects of future events. The plans of individuals are in a pattern equilibriuim if they are coordinated with respect to their typical features, even if their unique aspects fail to mesh (p. 85).

For the record, see what Hayek has to say about equilibrium. In his 1968 essay "Competition as a Discovery Procedure" (reprinted in *New Studies in Philosophy, Politics, Economics and the History of Ideas,* University of Chicago Press, 1978), Hayek states that the capacity of the theory of competition:

> [T]o predict is necessarily limited to predicting the kind of pattern, or the abstract character of the order that will form itself, but does not extend to the prediction of particular facts (p. 181).

> While an economic equilibrium never really exists, there is some justification for asserting that the kind of order of which our theory describes an ideal type is approached in a high degree.
>
> This order manifests itself in the first instance in the circumstance that the expectations of transactions to be effected with other members of society, on which the plans of all the several economic subjects are based, can mostly be realized (p. 184).

I fail to see how this notion of equilibrium is "inadequate for the analysis of processes in real time."

To get a handle on what the authors have in mind, one has to understand the force of their notion of endogenously generated changing knowledge. Their position is that "exact equilibrium," even Hayek's plan coordination, is impossible because the market process necessarily always generates unexpected

knowledge which must cause transactors constantly to change their plans. No equilibrium set of plans (plans that, in the absence of shocks, would not be revised) can be formulated because transactors are necessarily constantly bombarded with endogenous shocks to which they must constantly adapt.

This is certainly an important idea. One naturally hopes that the authors will explain this point with careful argument and good examples which make it clear and convincing. But they do no such thing. The point is illustrated by two scenarios having little to do with the world of economics, and these illustrations are taken as sufficient argument to establish the point.

The first scenario is Keynes's beauty contest—which Keynes originally used to illustrate a point concerning the stock market.

> A hundred photographs are reproduced in a newspaper. Each contestant must choose the six prettiest or handsomest faces. The winner will be that contestant whose choices most closely approximate those of "average opinion." The goal of each contestant is therefore not to choose the six most attractive to him or her . . . , or even to guess what average opinion believes to be the most attractive. . . . Rather, the object must be to guess what average opinion believes that average opinion will choose (pp. 72–73).

> [B]ecause the individual is making predictions of predictions rather than of tastes, resource availability, and so forth, the relevant information will be what others are predicting. Therefore, knowledge gained over time by market participants will necessarily affect the object of each agent's prediction. These considerations enable us to conclude that the very activity designed to cope with uncertainty (i.e., the acquisition of knowledge) is responsible for its continued existence (p. 74).

I think their conclusion is not sufficiently supported by the example. It is instructive that the illustration does not come from the usual world of economics. In typical market settings (not the stock market), the relevant pattern predictions that agents must make do concern "tastes, resource availability, and so forth." The only market setting I can think of wherein "predictions of predictions" are crucial is the Cournot oligopoly model. The authors referred to that model briefly on pp. 61–62 when discussing real time and promised that a "similar example" would be used later to discuss dynamic uncertainty. The "similar example" offered is the beauty contest. I infer from this that they, too, could not come up with anything more germane to the customary concerns of economists.

Moreover, in the beauty contest, the ends of the contestants are mutually inconsistent. Each contestant wishes to win, but there can be only one winner. It is a zero-sum game. Most market interactions, on the other hand, are positive-sum games. One must be careful to avoid coming to strong general conclusions regarding the competitive market process on the basis of examples of

zero-sum games. Yet the authors do precisely that. I will not be convinced "that the very activity designed to cope with uncertainty is responsible for its continued existence" in the competitive market process until the authors either come up with an effective a priori argument or many pertinent examples. They have done neither.

The second scenario (also a zero-sum game) is Morgenstern's Holmes-Moriarity story, which, as the authors say, is worth quoting in full. (Curiously, the authors give a better example, one from the world of economics, illustrating the point of the Holmes-Moriarity story in a footnote.)

> Sherlock Holmes, pursued by his opponent, Moriarity, leaves London for Dover. The train stops at a station on the way, and he alights there rather than travelling on to Dover. He has seen Moriarity at the railway station, recognizes that he is very clever and expects that Moriarity will take a faster special train in order to catch him in Dover. Holmes' anticipation turns out to be correct. But what if Moriarity had been still more clever, had estimated Holmes' mental abilities and had foreseen his actions accordingly? Then obviously he would have travelled to the intermediate station. Holmes, again, would have had to calculate that and he himself would have decided to go on to Dover. Whereupon, Moriarity would have "reacted" differently. Because of so much thinking they might not have been able to act at all or the intellectually weaker of the two would have surrendered in the Victoria Station, since the whole flight would have become unnecessary (p. 84).

This example shows that when *A* and *B* are adversaries, when *A*'s plan depends on *B*'s plan, and when both *A* and *B* have perfect foresight concerning the plans of the other, no stable set of plans can be formulated. There is no process by which equilibrium can be established. True enough, but largely irrelevant to the issue at hand. Surely, the authors do not mean to imply that any form of Hayekian equilibrium is precluded by such an example. Perfect foresight has never been a part of any Hayekian analysis of which I am aware.

The conclusion the authors reach from the Holmes-Moriarity story is that:

> [I]mperfect foresight is a necessary, although not sufficient, condition for a process to result in an equilibrium. This equilibrium cannot, however, be a position of exact coordination. A process in which there must be errors cannot, except by chance, culminate in an errorless equilibrium (p. 85).

How does one know that there "must be" errors in market processes? Presumably the beauty contest was to have convinced people of that. At least now people know that in the view of the authors, "exact coordination" is "errorless equilibrium." From the rest of the chapter, one knows, that "errorless" here means formulated on exactly correct predictions of all typical and unique features of future actions. But since Hayekian equilibrium notions are not

"errorless" in that sense, the reader is forced to the conclusion that "pattern coordination" is merely standard Austrian coordination correctly understood, or it is a well-disguised denial of any meaningful coordination at all.

It is difficult to tell which of those two options characterizes the authors' "pattern coordination" because they never really do a clear job of explaining what they mean. The idea fails for want of instructive and clear illustrations. The only example offered to explain what this key notion really means is, just like the beauty contest and the Holmes-Moriarity story, unrelated to the world of economics.

Pattern coordination, they tell us, is when future events are coordinated in their typical features but not in their unique features. They explain what they mean by asking the reader to consider the case of two professors working on a jointly authored book. The professors achieve pattern coordination of their plans when they know when they each will be available for joint discussions of their project. The unique features of these future events (joint discussions)—the actual details of who will say what and when he will say it—are uncoordinated. The knowledge necessary to achieve *ex ante* coordination of the unique features is unobtainable.

Try as I may, I cannot, from this example, see that pattern coordination is anything new at all. I know of no Austrian—certainly not von Mises, Hayek, or Kirzner—who ever maintained that plan coordination required coordination of all the unique features of future events. The content of "unique features" suggested by the authors' example is irrelevant to any sort of plan coordination. It is even irrelevant to many notions of neoclassical equilibrium. It seems to me that the authors, by misspecifying the requirements of "standard" notions of equilibrium, have trapped themselves into thinking that a whole new idea of coordination is needed to save a viable economics. In straining to differentiate "pattern coordination" from Hayekian coordination, they have led themselves toward the nihilistic views of Shackle that no viable economics is possible.

Chapter 6, "Competition and Discovery," begins the "Applications" half of the book. Inasmuch as I have always found that the examination of applications is the surest route to understanding points of theory, I had high hopes for the final five chapters of the book. And I was not totally disappointed. There is much that is excellent in chapter 6. The authors' present an effective exposition of the deficiencies of perfect competition in "A Parable on Competition," which likens perfect competition to a sports contest wherein the judges insist in repeated replays until the foreordained "correct" outcomes emerge. Their explanation of the logical and practical superiority of defining "competition" as rivalry rather than a state of perfectly competitive equilibrium is as good as I have seen. Their insistence that good economic analysis requires competition to be anlayzed as a process rather than as an equilibrium state should be at least credible to all but the most closed-minded neoclassical readers. Of

course, the sports contest analogy, like all analogies, is not exact. Inasmuch as there is only one winner in a sports contest, such contests are zero-sum games. While some features of interfirm rivalry may be characterized as a zero-sum game, the voluntary exchange basis of most of the competitive market process makes it a positive-sum game. In perfect competition, however, there is no rivalry at all. Perfect competition is in no sense a zero-sum game.

The section "Knowledge and Competition" examines the "five general characteristics of knowledge with which a Hayekian view of competition is concerned" (p. 104). The authors do a superb job of spinning out the implications of the fact that the relevant knowledge is sometimes private, often consists of information of temporary but crucial significance, is frequently tacit, and is often the source of surprise. Moreover, much of the relevant knowledge is communicated by nonprice signals such as evolved rules and customs.

The best section is "Process Theories and Normative Economics." I especially liked the discussion of the relationship between neoclassical general equilibrium theory and Adam Smith. The beliefs that modern neoclassical theory has identified the necessary conditions for the validity of Smith's laissez-faire conclusions and that those necessary conditions do not exist in the modern world are dead wrong. Adam Smith's views were based upon his process theory of competition. His laissez-faire conclusions in no way depend on the conditions of perfectly competitive equilibrium. They rest on the key insight that unhampered market processes are the best means available for the discovery and correction of economic error. Here the authors do an excellent job of debunking.

However, chapter 6 is not without its faults. And those faults are tied to the authors' notion of "pattern coordination." First, the authors reiterate their assertion that Hayek had a faulty notion of equilibrium which he later discarded in favor of a better notion that resembles the authors' pattern coordination. Here, at least, the reader gets a better idea of what they mean:

> Hayek originally defined as an equilibrium a situation in which there is both *ex ante* plan consistency, and no information disruptive of plans that agents are bound to learn in the course of executing their plans. [In chapter 5, the authors characterize this as "exact equilibrium."] Exogenous disturbances might occur before these plans are executed, and upset the equilibrium. As long as agents did not themselves bring about these disturbances by the very execution of their plans, their plans were coordinated and consistent (p. 100).

The last sentence of the quotation is, of course, where the authors believe that they have made an original contribution—the notion of endogenous learning precluding "exact equilibrium."

Hayek's later (1968) view of equilibrium, the authors say,

> embodies endogenous learning and entrepreneurship. Moreover it captures that essential element of competition that is absent from alternative economic conceptualizations: the element of surprise or the unexpected (p. 102).

I have already explained why I did not think there was an early Hayek and a later Hayek on the question of equilibrium. My view is supported by the passages quoted earlier from Hayek's 1968 essay "Competition as a Discovery Procedure" concerning the nature and usefulness of equilibrium. Any apparent differences between an early and a later Hayek on the question of equilibrium are due to differences in the expositions of his unchanged view.

But here another issue emerges:

> In his work on entrepreneurship, Kirzner has consistently adhered to Hayek's early view. Yet by focusing on entrepreneurship, we can understand better the reasons that surely entered into Hayek's revised approach to competition, coordination, and equilibrium. The fundamental problem is that the "tendency to equilibrium" view does not take time seriously. The latter is, of course, as serious an internal criticism as one could level against a subjective analysis (p. 100).

The unmistakable implication is that Kirzner, of all people, does not take time seriously and so ignores the elements of surprise and the unexpected in his work on entrepreneurship. In so doing, the authors assert, Kirzner makes himself out to be a poor subjectivist. This suggestion is simply beyond comprehension. Surprise, the unexpected, and unanticipated learning are all parts of Kirzner's analysis. That "endogenous learning" makes any difference at all has not been demonstrated. Keynes's beauty contest, the only argument the authors offer to support their contrary position, proves nothing.

The second fault with chapter 6 lies with the authors' discussion of rent control to illustrate the superiority of their concept of pattern coordination.

> After effective controls are imposed, housing services will be *temporarily* [emphasis in original] in excess demand. Lessors and lessees cannot make their plans mesh. *Over time, however, the housing stock will deteriorate until housing services supplied satisfy observed demand at the controlled rental prices* [emphasis added]. Even with market excess demand eliminated, plans continue to be frustrated, however, for renters cannot bid higher prices for the higher-quality units that they prefer (p. 115).

Now, what the authors should mean by the underlined sentence is that as the housing stock deteriorates, at any fixed rent per dwelling unit, the price per unit of housing services in those units increases. The tenants in such dwellings do not pay lower prices per unit of housing services because of the rent control. The higher price per unit of housing services eliminates the excess demand for housing services *in those units*. But the excess demand for housing services in better-quality dwelling units is *not* eliminated. In no sense is the "market excess demand" for housing services eliminated. The authors' statement that deterioration of the housing stock eliminates the market excess demand for housing services is an example of poor expositional judgment in the pursuit of originality.

In that same pursuit the authors go on to outline all the customary indirect effects of rent control—diminished mobility, growing demands for new controls such as condominium conversion restrictions, and so forth. That is all right, but they assert that only their analysis permits such insights to be gained. The truth is, of course, that such indirect effects of rent control have long been recognized even in neoclassical analysis.

There is much of value in chapter 7, "The Political Economy of Competition and Monopoly," which concerns such issues of law and economics as antitrust, pollution regulation, property rights, and deregulation. In fact, I think chapter 7 is excellent. Perhaps that is because nothing in it depends on the three dubious concepts of the theoretical chapters—pattern coordination, real time, and dynamic subjectivism. Any reasonably informed neoclassical or Austrian economist could read, understand, and benefit from chapter 7 without having read any of the rest of the book.

The chapter begins by pointing out that those who disapprove of the outcomes of the competitive market process without also disapproving of the process itself are logically inconsistent. Outcomes and the processes that produce them cannot be thought of as separate entities. "In objecting to market outcomes, one is in reality objecting to market processes" (p. 131). The authors note that among the outcomes frequently objected to by many who claim to approve of the market process are income and wealth distributions, various forms of market structure, and product differentiation. Some neoclassical economists characterize outcomes of which they disapprove as "market failures."

The authors do a splendid job of criticizing the standard neoclassical approaches to pollution regulation and antitrust policy on the same grounds that von Mises and Hayek used to criticize socialism in the socialist calculation debate—namely, the informational and calculational dilemma. The informational and calculational requirements of both pollution regulation (whether the command or "tax price" variety) and antitrust policy based on neoclassical notions of competition and monopoly cannot be met. Moreover, as Arrow pointed out in 1959, even in the neoclassical framework, except in equilibrium, all firms must be price searchers. The basic distinctions upon which U.S. antitrust policy is based are, therefore, meaningless.

The superiority of a process view of competition over the traditional static equilibrium view is well illustrated by the examples of deregulation of the airline and telecommunications industries. In these instances, several predictions based on static analysis (for example, that small towns would lose airline service and that the average cost of home phone service would rise because of the loss of economies of scale) were clearly proven wrong by events. What actually happened after deregulation is, however, easily understood using a standard Austrian market process analysis.

The final section of the chapter, "Property Rights Theory of Monopoly," argues effectively that the nature and source of entitlements to market shares

should replace downward-sloping demand curves and welfare loss triangles as the focus of analytical attention in antitrust. In other words, and I wish the authors had used these words, the focus of attention ought to be on the positive and normative analysis of "rent seeking." Austrians and a good many neoclassical economists have long understood that government favor is the only source of durable monopoly. The authors are remiss in failing, even briefly, to discuss the theory of rent seeking. Of course, the economics of rent seeking is usually not thought of as an Austrian innovation. It is usually associated with the public choice school.

There is one curiosity early in the last section of the chapter. There the authors assert:

> A monopoly right can encompass a great deal of economic activity or apply to a wide geographic area. . . . When monopolists holding market share or operating jointly in a territory or market cooperate, we call this a "cartel." Cartels are shared monopolies. There is thus no separate oligopoly theory (p. 149).

I think this is a non sequitur. Why should the analysis of shared monopolies preclude an oligopoly theory? More importantly, recall that the only obvious example from the world of economics that corresponds to Keynes's beauty contest is the Cournot oligopoly model. If there is no separate oligopoly theory, the authors lose their best illustration of endogenous uncertainty.

Chapter 8, written by Roger Garrison, is entitled "A Subjectivist Theory of a Capital-Using Economy." As its title suggests, it is about Austrian capital and interest theory. It is exceptionally well done. It is the only chapter in the book that gives von Mises the attention he deserves in any exposition of Austrian economics. A neoclassical economist who knows nothing about Austrian economics can learn a lot by reading this chapter. The author patiently explains each concept as he introduces them. It is all here: a brief historical sketch of the development of Austrian capital theory; a clear statement of why it is a subjective theory; and precise explanations of the structure of production, the period of production, roundaboutness, capital heterogeneity, intertemporal coordination, and the time-preference theory of interest.

For Austrians, capital and interest theory is the basis of legitmate macroeconomic theorizing. Garrison explains the connections between the two. He then discusses the effects of changes in preferences for liquidity and leisure on the structure of production through entrepreneurial adaptations to those changes. Finally, he traces through the normal adaptations to changes of time-preference and points out that although there is likely to be entrepreneurial error in the process of adaptation to such changes, there is no reason to expect a "clustering of error." He thus sets the stage for chapter 9, which exposits the von Mises-Hayek monetary theory of the trade cycle.

In the last section of chapter 8, "Subjectivism Revisited," Garrison puts the Cambridge "reswitching" argument against Austrian capital theory to rest.

He points out that because of the subjectivist definitions of period of production, roundaboutness, earlier and later investment programs, and original factors of production, the reswitching phenomenon implies nothing about Austrian capital theory. The Cambridge attribution of those categories to physical objects and techniques, rather than to the planning perspectives of decision makers, makes its critique irrelevant to the real world as well as to Austrian capital theory.

Chapter 9, "The Microanalytics of Money," discusses Menger's view of the evolution of money, the von Mises-Hayek monetary theory of the trade cycle, and rational expectations. The exposition is very good. Austrians and neoclassical economists alike will find much of interest in the chapter. Neoclassical economists can learn a lot here about the Austrian views of these matters, and Austrians can learn about Wainhouse's sophisticated econometric testing of the von Mises-Hayek model. Statistical evidence turns out to be consistent with six empirically testable hypotheses derived from that model.

I did get a scare when I read:

> In our analysis, we adopt Hayek's view of the cycle as a disequilibrium phenomenon. We restate his analysis, however, in terms of our own formulation of process theory. In particular, we argue that the distinction between typical and unique aspects of phenomena is especially useful in analyzing economic fluctuations (p. 199).

But it turns out that the authors never go beyond standard Austrian analysis. They use the words "typical" and "unique" on pp. 222–23, but in so doing they merely put standard Austrian analysis into slightly different words. There is no substantive difference between their exposition of their theory and standard Austrian theory of misdirection of resources, malinvestment, and clustering of entrepreneurial error.

Chapter 10, "Some Unresolved Problems," is the brief, final chapter of the book. In it the authors suggest three possible areas of research where the principles of the book might profitably be put to work: law and economics, the analysis of money, and the competitive market process. I agree that effort in these areas, especially the first and the third, could greatly benefit from the incorporation of the standard Austrian perspective. Unfortunately, there is little in this book that successfully promotes that incorporation.

In conclusion, I cannot recommend this book to either neoclassical or Austrian readers. A neoclassical reader cannot attain a clear understanding of the basic principles of Austrian economics from it. An Austrian reader will be bewildered by the authors' apparent inability to settle their own position on the question of the possibility of equilibrium or even the tendency to coordination that is central to any viable economics. It is sadly ironic that the authors, who have done so much to foster the Austrian revival, may have, in this atypical book, set it back. Austrians can take comfort in the knowledge that the damage is not irreparable.