



Time in Theory and History or Why I am Not a Historian

Author(s): Axel Leijonhufvud

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TIME IN THEORY AND HISTORY OR WHY I AM NOT A HISTORIAN

Addressing an audience of historians is for me a daunting task. I would have become a historian myself, had I dared. Instead, I chose the simplest of the social sciences from whence I can from time to time take a look at the activities of historians from a relatively short, yet safe, distance. I do so always with both admiration and envy. Envy, because history often seems so much more fun than economics; admiration, because it seems so forbiddingly difficult.

Time, I take it, is an essential element in History. This simple observation is quite enough to give the economic theorist pause—he knows there is trouble ahead if he ventures into such territory.

All economists have heard Joan Robinson quoted to the effect that “Time is a device to prevent everything from happening at once.” (To which adage someone else has added the observation that “space is a device to prevent everything from happening in Cambridge” . . . and, if it did, one can only imagine what that would do to the lawns at the Backs.) But economic theorists have terrible trouble trying to prevent everything from happening at once in their models. They have found no easy way to make use of Joan Robinson’s device.

Economists tend to believe that in order to make sensible and informative statements you have to have a model. Most of them are also quite attached to the belief that models should be built on optimizing behavioral foundations. Now, it is not at all easy to model a world that is, as Sir John Hicks likes to say, “in time,” but if you insist on describing all behavior as optimizing, the task becomes just about impossible.

For a theory to be “in time” in the Hicksian sense, its future has to become the present and the present turn into the past. For agents immersed in the flow of time, the unknowable becomes the conceivable and then the possible; the possible, drawing nearer, becomes the probable and then experienced and known; the experienced becomes a mat-

AXEL LEIJONHUFVUD is Professor of Economics, University of California, Los Angeles. This address was given as the after-dinner speech at the annual All-University of California Economic History Conference at UCLA, May 4, 1985.

ter of record . . . and eventually, at least if historians are in short supply, most of it becomes a matter of *lost* records.

Now, optimizing models will deal easily with the probable and the known, but will not accommodate the merely possible or conceivable, much less the inconceivable that is nonetheless going to happen. But in model-worlds where everything is known either for certain or as a certain probability, agents will make all their allocation and trading decisions at the outset. Nothing prevents “everything from happening at once.” Time has escaped. And history, then, has no place.

I would like to bring to your attention a brave but neglected attack on this formidable problem. The author is Raymond Guarnieri.¹ Guarnieri actually began by considering the problem of predicting the future, and thus backed into the problem of the historical past rather inadvertently—which is probably the safest way to approach it.

Guarnieri’s point of departure was the somewhat trite observation that, for some centuries now, economists have done rather badly at prediction. He conjectured, as I’m sure we all would, that the trouble must be that divination of the future had not been put on a completely rigorous foundation. It was not immediately obvious, however, how the requisite rigor was to be supplied and Guarnieri was apparently stuck at this point for some time. Then, in his own words:

The light dawned on me some days later when I was calling my broker to place an order to buy short. Of course, thought I, the exact counterpart of the futures market with perfect certainty is the pasts market. Accordingly, if we could rigorously prove existence, uniqueness, and stability of pasts, we should obviously have come a long way toward prediction—albeit in the wrong direction. But this could be corrected—or so I was assured by an excellent second-rate mathematical economist—by appropriate changes in sign.

The *existence* of the past posed no problems for Guarnieri. Given a number of quite conventional assumptions, he found that he could prove existence by a straightforward application of “Krakatoa’s Pointless Theorem,” for which he credits the French colonial mathematician Pacifique Krakatoa whose dates are given as (1947–1883). There remain some doubts in my mind, however, how robust this result is.

The existence of the past is, in fact, a difficult problem and one that historians, in particular, do not seem to have taken seriously enough. We find the fundamental problem, perhaps in its original form, in the medieval scholastic dispute over Adam’s navel. The issue, as you will recall, was whether Adam should be depicted with or without a navel. One theological faction maintained that one should not attribute

¹Raymond L. Guarnieri, “A Suggestion for Rigorizing the Theory of Prediction,” *Western Economic Journal* (1973).

meaningless or superfluous actions to the Lord; a navel would be superfluous on Adam; ergo, Adam had no navel. The opposed faction argued that Man is made in God's image; men have navels; ergo, the Lord and Adam have navels.

Now, clearly, the second faction had the stronger argument. In any case, it had the winning argument—as a check of a few churches and museums will quickly prove. So, it is agreed that Adam had a navel. The problem with that conclusion, however, is that it admits into the world strong and convincing *evidence of a past that never was*—in this case, evidence that would seem to indicate that Adam had a mother.

It may be that few modern historians have taken the problem of Adam's navel seriously, since the contemporary theory of evolution has no place for Adam himself. But to dismiss it in this way is to miss the more general version of the argument which is credited to Phillip Gosse. Gosse defended the creationist position against the use by evolutionists of geological evidence that seemed to show that the Earth was older than indicated in the Bible. He argued that when the Earth was created it was created with the geological strata laid down as we see them today—and containing, from the outset, the bones from extinct species and so on. It is an incontrovertible argument and you will appreciate at once how it puts the *existence* of the Past in doubt. It is, after all, quite conceivable— isn't it?—that we were all created an instant ago, complete with memories of a nonexistent past, including the memory of the first half of this talk!²

Guarenieri's use of the Krakatoa Pointless Theorem, therefore, will hardly put all doubts to rest on the existence issue. When it came to uniqueness, he also took a much different tack, seeking to ascertain the uniqueness of the past inductively by comparing commodity-market quotations in old newspapers. He satisfied himself in this manner that the past market was indeed unique up to the occasional misprint. The Guarnieri approach to the future is seen, somewhat surprisingly, to be philosophically grounded in the Rankean approach to the past—*mutatis mutandis*.

The stability of the past and what it may—or may not—imply about the stability of the future turns out to be the perhaps most difficult problem in this general area and it gave rise to some discussion already before the publication of Guarnieri's paper. (I think that, after the lapse now of more than ten years, I may reveal that I was the anonymous reviewer who recommended publication of the paper to the then-editor

²The Gosse impossibility theorem, according to which there can be no empirical proof of the existence of pasts, and its antecedents are lucidly discussed in Martin Gardner, *Fads and Fallacies in the Name of Science* (New York, 1957), 124–26.

of the then-*Western Economic Journal*, Robert Clower. And I still think that Guarnieri's contribution certainly deserves being neglected in *Economic Inquiry*, as it is called today, rather than in some less prominent journal.)

In the original version of Guarnieri's manuscript, he claimed to have demonstrated the stability of pasts. He concluded that the future, therefore, would be stable too. This, I thought, was an error:³ If the past could be shown to be stable as time goes to minus infinity, then one must conclude that the future is *unstable*. Our disagreement on this point gave rise to a voluminous correspondence forth and back between us. Unfortunately, time will not allow me to go into all the technical details.

Consider an Einsteinian universe. Next, abstract from the three Newtonian dimensions. (This kind of elegant analytical simplification may give pause to physicists, but economics training which accustoms you to turning n goods into one GNP imparts an intellectual daring sometimes lacking in other fields). Einstein minus Newton leaves us with one dimension, a time line. Now, imagine a scientific observer in this universe. We position him at $t = 0$, facing the past and with his back to the future. His task is to draw inferences about what is going on behind his back from what he can observe in front of him.

Such an observer has to choose in which sequence to make his observations. He may deal with time *retroactively*, starting with states of the world farthest away from himself and arriving eventually to what is right under his nose. Or he may adopt a *retrospective* procedure, taking near observations first and proceeding toward minus infinity. The retroactive treatment of time is that commonly used by historians. Economists may, therefore, suspect it to be suboptimal. And, indeed, if one assumes a quadratic utility function attaching greater value to information about "near" than about "distant" states—as seems only sensible—one will reject the retroactive in favor of the retrospective approach.

The question of stability is a question about whether such sequences of observations show convergence or not. (The notion of convergence may at first seem an intuitively difficult one in the single-dimensional universe of our conceptual experiment. The best way to think about it is to suppose that past states of the world are color-coded and that we know, for instance, the sequence green-blue-red to be convergent whereas red-blue-green is divergent.) My position, in brief, was and remains that rational observers must be assumed to adopt the retrospective mode; if retrospective sequences are seen to converge, the rational inference to be drawn is that *the future is surely exploding behind our backs!*

³In correspondence, I went so far as to call it the sort of error that could do "irrevocable damage" to one's reputation. That, of course, was my error. It simply showed that I had not yet grasped the power of Guarnieri's sign-reversal technique.

At this point, Guarnieri tentatively advanced the notion that, perhaps, one should think of the observer as facing forward after all and as observing the past through a rearview mirror. I forebear on this occasion to analyze this theory in detail. Suffice it to say that, while the use of mirrors may seem convenient in the single-dimensional case, it produces horrendous problems as soon as we start to restore dimensions by disaggregation. The use of mirrors necessitates a clear definition of the relevant axis of symmetry. Passing over the complications of general equilibrium, consider just the simplest case of an isolated market. Which of the two mirror-models below is the relevant one?

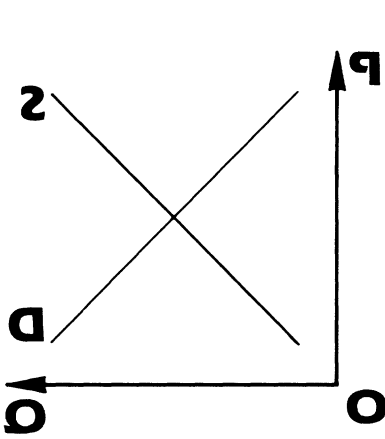


Fig. 1A

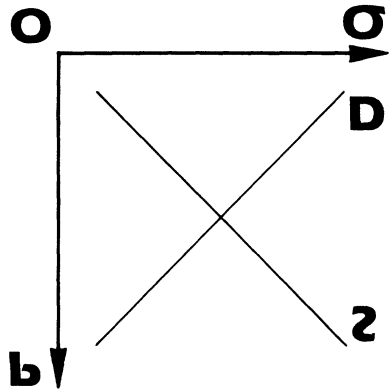


Fig. 1B

This, on the whole, is where the matter still stands today. It should be clear to everybody that we have much work to do before History can be put on a sound theoretical foundation. We ought then to heed the poet's admonition: "*Dum loquimur fugerit invida aetas.*" Who knows, alas!, whether it is coming or going?