

Posted to the Gilder forum - April 8, 2001

Complexity and the FED

[John Reed](#) retired as co-chairman and co-chief executive of Citigroup in April last year. He was named chief executive of predecessor Citicorp in 1984.

While running one of the largest banks in the world, providing financial services to about 100 million consumers in 100 countries, Reed knew he had a problem. -- what his economists were telling him was not working out in practice. Either the economists didn't know their job or their economic model of the world was wrong. Faced with this problem, Reed got on touch with the [Santa Fe Institute](#) and with economics professor [Brian Arthur](#). Or maybe it was the other way around, the institute, looking for money, approached Reed and Citigroup. Whichever is the exact story, the outcome is that the Santa Fe Institute did a lot of research on complex systems including economics, the stock market, flocks of birds and schools of fish, emerging behavior, learning and many other interesting things.

I'm not about to explain how complex systems work partly because I don't really understand them, but some very interesting facts do stand out. For example, the brain is a complex system made up of millions of neurons and there is no chief neuron organizing things. The flight of a flock of birds can be simulated by giving three very simple instructions to the birds: 1, fly at the average speed of your closest neighbors; 2, keep at a certain distance from your closest neighbors; and 3, fly towards the center of gravity of the flock. That's it! No central mastermind is needed to keep the flight of the flock organized. There are many more beautiful examples described in the book [Complexity: The Emerging Science at the Edge of Order and Chaos](#) by Mitchell Waldrop. One of the interesting things studied at Santa Fe were [genetic algorithms](#) originally studied by John Holland. based on the use of these genetic algorithms, computer models were able to get organized and to learn, again, without a master director.

The classical model of economics is strongly influenced by Newtonian physics. Physics is the hardest of hard sciences while some people doubt that economics is a science at all. To make up for this disparagement, economist rely heavily on mathematics and they use the Newtonian universe as their model. The Newtonian universe is in equilibrium. The earth flies around the sun just fast enough to stay

in a stable orbit. Matter and energy are conserved. In classical economics supply and demand are also in equilibrium. There is a negative feedback mechanism that makes sure that any alteration of this equilibrium is quickly removed from the system. The flywheel or governor in a steam engine is a negative feedback system. If the engine turns too fast, the weights fly out and reduce the supply of steam. If the engine slows, then the weights collapse and increase the supply of steam.

The stock market is also supposed to work according to the classical economics model, always returning quickly to equilibrium. Well, we have just witnessed one of the biggest bubbles ever followed by the second worst bear market ever. The market is certainly ignoring the classical model. According to the science of complexity, evolution does not happen at a steady pace, quite the contrary. There are long periods of stability and sudden advances and mass extinctions like the disappearance of the dinosaurs. Earthquakes also exhibit a similar pattern, many small tremors and one or two killer quakes. There is a simple experiment that you can do at home. Get a few pounds of sand or salt and start pouring it slowly on a flat surface. At first the sand (or salt) pile is steady. As you pour more and more, you start seeing avalanches as the pile tries to remove the excess strain that develops. No matter how steadily you pour, the growth of the pile and its avalanches is not steady at all. And what is really interesting is that by studying any one grain of salt or sand, you cannot make predictions about the next avalanche.

Brian Arthur has been advocating the law of increasing returns as the proper model for economics. Increasing returns does not drive systems toward equilibrium like the flywheel of the steam engine described above does. On the contrary, it makes prediction impossible. This drives classical economists out of their minds because all their beautiful mathematical models are then for naught. All the precision of the Newtonian world is gone. There is no reason for economists to cling to Newtonian physics because they have been superseded by uncertainty (Heisenberg), relativity and by quantum mechanics. The truth is that the economic models proposed by Arthur based on increasing returns describes the real economy much more accurately than the classical models. This, of course, also means that predictions are not possible.

What does all this mean? First of all, complex systems do not need a master mind

to function well. Second, even if there is a master mind, he has no way of predicting the future and much less the ability to take preventive action for this unknowable future.

Let's analyze Alan Greenspan and the FED in the light of complex systems. If the above is true, then, at best, Greenspan and the FED are powerless to influence the future because the future will do whatever it wants to do. At worst, Greenspan and the FED are super agents with thousands of times the power of us individual agents and any action they take will be catastrophic because it is so out of proportion with what the system is designed to deal with. On top of that, Greenspan and the FED use the classical model of economics as their guide so it is impossible for them to ever get it right.

In baseball terms that's three strikes! Either they are powerless or they have too much power and in neither case do they really understand what needs to be done. Alan, you're OUT! As I have said before, it's not a case that Alan does not know his economics. He is doing a job that does not need doing and that cannot be done.

Please call your congressman and ask him to close down the FED before they do any more damage.

Denny

["Demand creates queues. Supply gets rid of them."](#)
[Software Times](#)

On 4/8/01 11:25:22 AM, venuv wrote:

I am fairly familiar with the work at Santa Fe Institute, and very much so with the work of Melanie Mitchell, John Holland etc. on emergent behavior. Santa Fe Institute's work is very speculative even in predicting orderly phenomena (e.g. how to combat computer attacks using emergent phenomena), let alone the entirely stochastic ones like the economy.

While there are a number of smart people there, nothing could be more disastrous than running this country on the theory of an SFI person. You are better off handing over the country to the Michigan Militia or the Hale Bopp (meteor) crowd.

As for John Reed, there are a number of normal people who do goofy "fun" things when they retire. Lew Platt (ex-CEO of HP) is now CEO of a winery. I don't waste much time explaining their mental meanderings.

On 4/8/01 1:35:08 PM, Denny wrote:

>>>As for John Reed, there are a number of normal people who do goofy "fun" things when they retire.

Be that as it may, Citibank started funding the SFI in the late 80s when Reed was most definitively UNretired as chairman of Citibank. Brian Arthur is Citibank Professor at the Santa Fe Institute which leads me to believe that Citibank continues to fund the place.

Arthur

Brian Arthur is also a Coopers & Lybrand Fellow, and he was the Dean and Virginia Morrison Professor of Population Studies and Professor of Human Biology at Stanford, 1983-1996. It would seem to me that Stanford, Coopers and Citigroup are slightly more respectable than the "Michigan Militia or the Hale Bopp (meteor) crowd."

But I am not advocating giving control to SFI. Quite the contrary, I am advocating the removal of controls. I am advocating the return to laissez faire, laissez passer of a past golden age. It was clearly the lack of controls that allowed them to flourish. One of the reasons the Soviet Union disappeared was their crummy centrally controlled economy. The FED is nothing more than the western equivalent of Soviet Central Planning and it is producing equally disastrous results. This is not a moral issue of bad communist vs. good capitalists. It is an issue of the evil of central planning which is nothing more than a monkey wrench in the gears. The Santa Fe Institute is not supposed to replace the FED. It is spawning the intellectual basis for closing down the FED.

Denny

"Demand creates queues. Supply gets rid of them."

[Software Times](#)