Work in Progress on application of dynamic systems theory to the A series (1)

At this point there seem to be a variety of ways to proceed. The FitzHugh-Nagumo (FHN) model, as used by Longtin (2002) and others, could perhaps be very useful - we'd have liked to have gone down that road - but does not seem a sufficiently developed approach at the present time (Note 1) and as it stands could add complications without adding enough merit.

The approach, roughly defined by Lange (2001) and indeed Guastello (2002) also carries problems.

Something a bit more basic, beginning with the work of Sprott (2005) and Gottman (2002), is a more basic approach. There seems no reason why it cannot be a useful line to follow, bearing in mind the analogous success of the Kuramoto model and then extended work along the same lines. As Strogatz (2003) points out, that very basic model and indeed almost too simple a model did lead to further breakthroughs. So something basic is what we will try: At this point, in our hearts is phase locking of a leaky integrate-and-fire model - at the very least - but we stick with looking for a simple and fairly descriptive model at least for a start. Like Winfree, perhaps, we are looking for early experimental success.

Dreams were first made predictable by the work of Stick gold (2005) who showed us how to actually create dreams in advance. Whilst we would like to consider them to be dreamt prior to their creation as I seem to have already done in accord with possible expectations (Yates, 2006), the neurology should have similarity so we can look at the Stickgold work first.

I am waiting to obtain my copy of Stella and may use it to explore the present situation in more detail. I have already looked briefly at Rinaldi's (1998) Laura-Petrach model (Note 2), obtained graphs, and thus note that suitable comprehensible models are possible.

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Notes

1. The following quote gives one Encylopedia style summary (Thomson-Gale, 2005) of the recent situation on catastrophe theory: "Despite the initial acceptance of the theory, it eventually became controversial. The number of variables involved in a discontinuous process must be small in order for catastrophe theory to model it with any accuracy. In the real world, however, especially in inexact sciences such as biology and sociology, these conditions rarely occur. One less than practical application of catastrophe theory involved its use to model the escalation of hostilities between nations. The variables used were threat and cost. It was argued that catastrophes—in this case, sudden attacks or surrenders—would occur when threat and cost were both high. Although such a model might be used to describe theoretical nations in very general terms, many more variables come into play when real people and real nations are involved. Therefore, such a model could not be used to make predictions of any practical value. Catastrophe theory was also applied with ***varying degrees of success and failure*** to social topics ranging from the stock market to prison riots to eating disorders."

"Varying degrees of success and failure" is probably the key term. Results depend very much on the particular model and the degree and variety of accuracy expected from it. The attitude of mind of a theoretical chemist rather than that of a fundamental mathematician or even psychologist is probably more appropriate in very general terms, but all techniques (including catastrophe theory in that name or some other) available to the problem could need to be applied. In that sense we are still in accord with workers such as Winfree or even May, up to a point.

2. I used the stimulus made by the computer in producing the dream to place Laura as the conscious mind and Petrarch as the dreaming (unconscious) mind of the same person. This could mean that beta1 is not zero (when it is, you do not seem to get a phase diagram for the values considered). I mainly used L(0) as 2 with delta as 0 and lowered the coupling between 'conscious' and 'unconscious' by bringing beta1 down to 0.1 .

The periods used were not 'years' but brief periods like days or weeks. In fact the interesting results for me occurred mainly within the first three 'periods'. I'm not too clear how gamma is best interpreted in this rough model and did best leaving it alone.

Also raising beta1 to 10 (strong coupling between conscious and unconscious) was tried and increasing the rate of fade for Laura to alpha1 as 100 and a quick fade for Petrarch as alpha2 as 10 . Neither gave an obvious loop.

I will not show the graphs as readily available mathematics programs like Madonna can produce graphs. Indeed some graphs can be readily obtained using a web solver and for Laura/Petrarch I would mention Weckwesser (2006). Values such as alpha1,2,3 as (3,1,0.1) and beta1,2,3 as (10,10,10) gamma as 1.0 , delta as 0 , AL as 2.0 and AP as - 1 are intriguing for example. What is

needed is a slightly more precise approach which I am presently considering.