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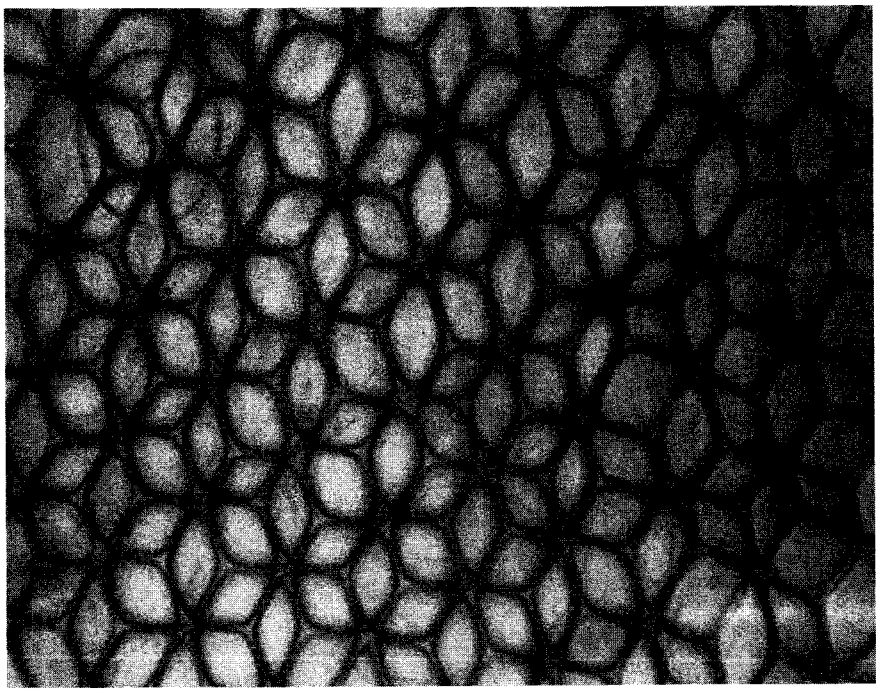

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Multistable Switching Series in Chaotic Nets

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Abstract: *Examples of conscious and interpretable responses that have two or more forms alternating to the same stimuli have been known for centuries, and methods of describing how such situations arise have evolved in biological science. When switches between transient, perceptual or cognitive responses can occur and are mixed serially within time series exhibiting local terminal stability, then patterns arise where psychological data series are too brief to analyse empirically, and neurophysiological data and mathematical simulation are necessary. Modelling such conditions can be approached by using one modified Markov matrix, which we illustrate if we allow some singularities to exist in the dynamics. As soon as networks cease to be homogeneous and have a number of attractors present and operate with different local structures, then one or more response patterns may potentially exist at the same time. The patterns may be addressed within the behavioural dynamics by incorporating in turn very short transients that can be voluntary or involuntary, in sensory and cognitive data. Related software work for modelling, employing hierarchical Dirichlet structures projected into hidden Markov matrices is noted.*

Key Words: multistability systems, time series, switching, chaos, networks, neuroscience, cognition

Do you see yonder cloud that's almost in shape of a camel?...Very like a whale?
--Shakespeare, W. (1600), *Hamlet, Act III, Scene II*, lines 393-398.

Our topic has a long and evolving history. At least four hundred years ago we knew that the picture of vague sensations that are alternatively switched from one remembered and associated image to another is something easily created by suggestions. Clouds provide us with images of fractal boundaries such that their size in any physical dimension or distances cannot be simply estimated by the observer, and vary over time so that similarities between images can change for observers. Yet there is a difficulty in entertaining two images at the same moment, it is rare for the observer to see at one instant a mixture of a camel and a whale. Within neural networks are memories that store simultaneously, for rapid recall, records of diverse patterns that in multistability become sensations that might apparently alternate. So we have to attempt to

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