

1970's
Prigogine
 Nobel Winner for
 non-eq thermo

Mandelbrot & Gerstein
 1964 Biophys. J. paper
 Random walks and spike activity

Katchalsky
 Mathematical
 biophysics

1971*

Walter Freeman
 meets Katchalsky

Katchalsky Killed by terrorist.
 Freeman names "K" set in
 his honor. In 1975
 published Mass Action
 in the Nervous System

1977-**Arnold Mandell**
 meets Mandelbrot

1982
 Mandell -proposed the
 idea of "strange attractor" at
 Haken's Synergetics Meeting
 in Germany

Scarda & Freeman 1987 BBS paper:
 How brains make chaos in order
 to make sense of the world.

Late 1980's to Early 1990's Chaos becomes the rage.
 Use of nonlinear dynamics is common place in physics today.
 Use of nonlinear dynamics in neurobiology still **almost non-existent**.

Reasons:

- Poor interaction between fields (medline).
- Poor support and publishing in neurobiology.
- Wide spread ignorance of basic concepts and methods.

* Freeman, W.J. (1983) Dynamics of self-organizing neural systems in attention and perception of rabbits: A reflection of Katchalsky's contribution. From A. Oplatika & M. Balaban Eds. Biological Structure and Coupled Flows, Academic Press.