Brain Dynamics - a synergetic view

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synergetics: physics (lasers, fluids), biology (morphogenesis, evolution), ecology
spontaneous formation of patterns, structures, functions - general principles?

brain: 100 billion of neurons, highly complex, self-organization

dynamical system: high-dimensional state vector $q$, control parameters $a$

$$\frac{d q}{dt} = N(q, \alpha) + F,$$
$N$ : nonlinear, $F$ : stochastic (noise!)

close to instabilities, bifurcations, non-equilibrium phase-transitions

$q = f(\xi, t)$, $\xi$: order parameters, low dimensional dynamics

slaving principle new qualities

1) phenomenological: finger movement coordination

perception: vase - face ambiguous figures, oscillation

2) microscopic neuron

pulse coupled neural network

pulse synchronization binding problem ?

pattern recognition (associative memory)

saturation of attention quasi-attractor

attractors (ANN)