AS-74.4192 Elementary Cybernetics

Bonus Lecture "∞":

Convergence of Diversions

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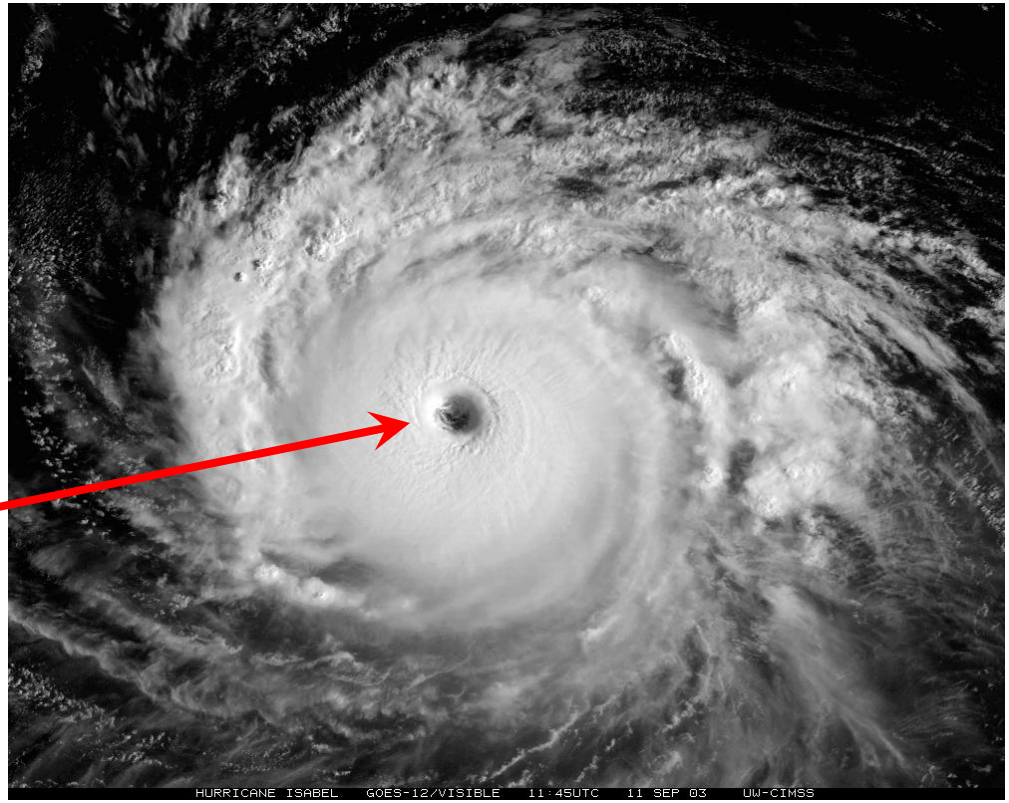
- Because “the world goes round and round”, step-by-step attempts to get nearer to the center change into *whirls*

- *But the random walk is now over, and we already know where the goal is!*



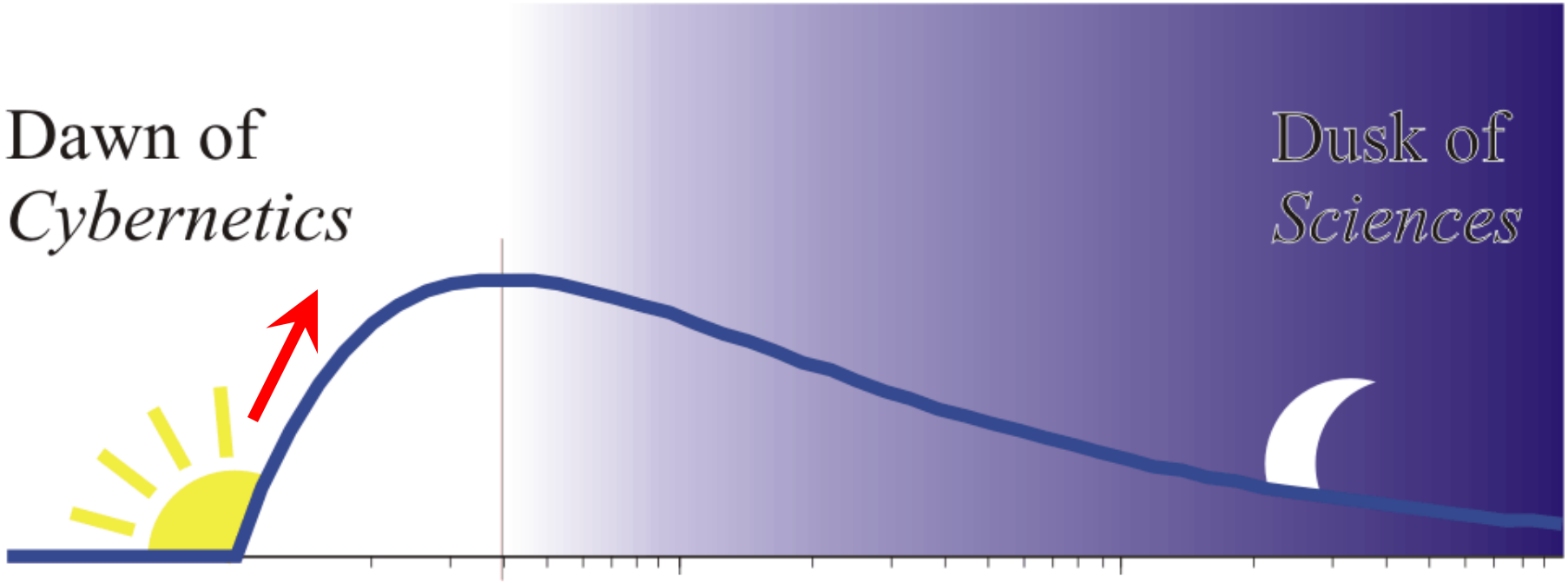
New concept candidates – are they *attractors*?

- Emformation = Neocybernetic "emergent information"
- **Emergy** = What makes things go round in systems!
- Emmersion = Immersion of a system in its environment
- Emiosis = System semiosis, system's way to see the world
- **Empedance** = "Impedance" $Z = Q\mathrm{E}\left\{\overline{xu}^{H}\right\}\mathrm{E}\left\{\overline{xu}^{H}\right\}^{H} Q = Q\mathrm{E}\left\{\overline{xx}^{H}\right\}$
- Emolution = Evolution as extended to a universal setting?
- Emulation = Simulation of attractor candidates
- Empathy = Trying to see nature as *it sees itself* …

… From this, one can also derive the word "em-pathetic" for describing the *emesis* after the hubris!?

“Theory” getting more and more theory-like …

- Year 2006 theory as presented in Report 151 …
- Year 2008 theory as presented in previous Lectures …
- Year 2010 theory would probably follow the lines shown here!



”… tuhannen kultaisen auringon kiertoessa …”

Constructing the airlift through the turbulences

- No more excuses needed
  - There is no more need to "remember the reality": processes studied are exactly known, and, yes, they ARE linear
  - Final controls are abandoned: there is no need to synchronize signal-level and model-level dynamics; there are no initializations of x
- Goal is to make research theory-directed again (?)
- Contents of the lecture:

1. *First: determine the basics*
2. *Then: implement the assumptions*
3. *Additionally: find the missing pieces and fill the holes!*

Main part

This is now *serious* theory – there are no pictures!

Basics #1. *Extreme naturalism*

- Complete subjugation
  - The system consists of local actors that know nothing about the big picture; they are completely on the mercy of their environment, so that emphasis can be concentrated on visible global-level variables
- Generalized diffusion
  - The actors all the time implement "random walk", moving in varying directions; on the global scale, this is manifested as *diffusion*: where there is more, there will be less, and *vice versa*, gradients becoming smoothened
- Universal evolution
  - Extending the idea of Dobzhansky: "nothing in complex systems makes sense except in the light of **emolution**"; only somehow beneficial behaviors become magnified, outperform other behaviors, and finally become visible

Note: later these can be extended to non-physical domains

Basics #2. Weak emergence

- The studies are concentrated on epsilon-sized elements **ε**, so that properties characterizing the elements can be presented using distinct scalar variables (like ξ and ζ below)
- How to capture intuitions about emergence in one formula?
- There are some intuitions that are followed here. First, emergence has to be related to *infinity*, so that phenomena are *abstracted over time*. Second, emergence somehow has to capture *interaction*; product $\xi\zeta$ is an atom of interaction, so that, when combined, this gives the following expression

$$\mathcal{E}(\xi,\zeta) = \lim_{T\to\infty} \left\{ \frac{1}{t-T} \int_{-T}^{t} \xi\zeta \, dt \right\}$$

Integration can take place also over spatial dimensions

- This $\mathcal{E}(\xi,\zeta)$ is now called "emformation".

Basics #3. System semiosis

- To understand what happens in a system, one has to study "system semantics" – why system does what it does, really
- Here discussions concentrate on *pragmatic semantics* – "what makes the difference" for the system
- More appropriately, one has to study *system semiosis*: what are the important variables as seen by the system
- Key issues in this *emiosis* is the selection of *external resources* $\overline{u}_j$ where $1 \leq j \leq m$, and *internal activities* $\overline{x}_i$, or **monads**, where $1 \leq i \leq n$, caused by the resources
- The *external view* of the variables is that the *inputs u* are some kind of *pressures*, and the *system state variables x* are the corresponding *yields*. Or they are *causes* and *effects*.

Basics #4. Emergy – the key forward

- Emergy is emformation among *relevant* variables
- It is beneficial to study analogues:
  - energy = deformation × force (tension) causing it
  - power = flow × potential giving raise to that flow
- In the similar manner,
  - emergy = *average* of activity × resource inducing that activity.
- In practice, emergy can be expressed using the notation

$$\mathrm{E}\left\{\bar{x}_i \bar{u}_j\right\}$$

- Specially, "self-emergy" typically describes the internal energy / power, being a compact quantity: $\mathrm{E}\left\{\bar{x}_i \bar{x}_i\right\} = \mathrm{E}\left\{\bar{x}_i^2\right\}$

Model building: Trying to survive – *feedforward*

- Diffusion (a *linear* phenomenon) can assumedly be written

$$\bar{x}_i = \alpha_{i1}\bar{u}_1 + \cdots + \alpha_{im}\bar{u}_m$$

Traditional diffusion $\frac{\partial f}{\partial t} = D\left(-\frac{\partial^2 f}{\partial x^2}\right)$

- From this, the expression for self-emergy becomes

$$\mathrm{E}\left\{\bar{x}_i\bar{x}_i\right\} = \alpha_{i1}\mathrm{E}\left\{\bar{x}_i\bar{u}_1\right\} + \cdots + \alpha_{im}\mathrm{E}\left\{\bar{x}_i\bar{u}_m\right\}$$

- Evolutionary winning strategy can be defined as

$$\text{Maximize} \quad a_{i1}\mathrm{E}\left\{\bar{x}_i\bar{u}_1\right\} + \cdots + a_{im}\mathrm{E}\left\{\bar{x}_i\bar{u}_m\right\}$$

$$\text{when} \quad a_{i1}^2 + \cdots + a_{im}^2 = b^2$$

There is a cost for keeping up the coupling

- Lagrangian technique gives (surprisingly!): $\alpha_{ij} = q_i\ \mathrm{E}\left\{\bar{x}_i\bar{u}_j\right\}$

No more need to refer to some Hebbian principle, etc.!

Paying the toll – *feedback* and "*feedfurther*"

- The only route to communicating among actors is through the environmental feedback; actors do not "see" neighbors, they only see changes in their shared resources
- This is the key to *self-regulation* and *self-organization*
- If the input and state have the same interpretation, feedback is a transpose of the feedforward; otherwise scaling needed

- Assume that systems are interconnected or there are trophic layers, so that emergy gets shared
- Then the final state is $x' = x - Ax'$ assuming proportional loss
- It is this x' only that remains visible – when it is thus used for model adaptation, substituting x for x', everything remains OK.

Putting the system on wheels

- It turns out that the monads self-organize and get oriented towards "modes", or statistical "self-emergy structures" in input data
- But this happens only if the coupling q_i is strong enough, otherwise that monad decays to zero
- The connection between the self-emergy of the monad *i* and the self-emergy of the corresponding data structure *j* is

$$\mathrm{E}\left\{\overline{x}_i^2\right\} = \sqrt{\frac{\lambda_j}{q_i}} - \frac{1}{q_i}$$

so that the *threshold* for monad existence becomes $q_i > \frac{1}{\lambda_j}$

- To eliminate need for adjustable parameters, Q needs to be automatically determined based on local information only
- This robust choice keeps x always active – *but not too much*:

$$Q_{\text{opt}} = \begin{pmatrix} \frac{1}{\mathrm{E}\left\{\overline{x}_1^2\right\}} & & 0 \\ & \ddots & \\ 0 & & \frac{1}{\mathrm{E}\left\{\overline{x}_n^2\right\}} \end{pmatrix}$$

Evolutionary motivation

- There are various benefits: it equalizes internal and external variances, it maximizes system's self-emergy, etc.

Now – you can make a (feedback) loop back to Lec. 4!

Summary: neocybernetic theory in a nut's-hell

- There is a compact cost characterizing neocybernetic systems

$$J = \frac{1}{2}\bar{x}^T\left(\mathrm{E}\left\{\overline{xx}^T\right\} + Q^{-1}\right)\bar{x} - \bar{x}^T\mathrm{E}\left\{\overline{xu}^T\right\}u$$

- It turns out that the converged system represents a principal subspace model of input data with basis vectors (DOF's)

$$\theta = \sqrt{Q\mathrm{E}\left\{\overline{xx}^T\right\}^{-1}}\ \mathrm{E}\left\{\overline{xu}^T\right\}$$

- More interestingly, the global level model based on local actions implements *sparse-coded compression* of data

- Next – interpretations …

Benefit of mathematical patterns

- The cost criterion is the most compact characterization of behaviors, and this makes it possible to see connections
- For example, the cost can be written in the following form

$$J = -\frac{1}{2}\bar{x}^T \underbrace{\left(\mathrm{E}\left\{\overline{xx}^T\right\} - Q_{\mathrm{opt}}^{-1}\right)}_{W}\bar{x} - \underbrace{\bar{u}^T \mathrm{E}\left\{\overline{xu}^T\right\}^T}_{V}\bar{x}$$

- The weight matrix W is symmetric and its diagonal is zero …
- Thus J can be seen as a Lyapunov function of a Hopfield net
- This offers us additional intuitions for free: *there are various minima, and convergence is dependent of the initial state*
- So, if no explicit initialization, one can model *continuums*!?

Step aside: connection to *parameter estimation*

- Regarding the converged system state as data, the ϕ matrix can be seen as a set of parameter vectors estimating input:

$$\hat{u}_j = \left(\phi^T\right)_j^T \bar{x}.$$

- Now, the *stochastic Newton algorithm* for adapting the parameters, having *quadratic convergence*, could be written

$$\left(\phi^T\right)_{j\,[k+1]} = \lambda\left(\phi^T\right)_{j\,[k]} + (1-\lambda)\,\mathrm{E}\left\{\bar{x}\bar{x}^T\right\}^{-1}_{[k]}\,\bar{x}_{[k]}\left(u_{j\,[k]} - \left(\phi^T\right)^T_{j\,[k]}\bar{x}_{[k]}\right)$$

- Note that (surprisingly) the "robusted" version of these, when combined, equals the correlation matrix adaptation scheme:

$$\left(\phi^T\right)_{[k+1]} = \lambda\left(\phi^T\right)_{[k]} + (1-\lambda)\;\; Q_{\mathrm{opt}\,[k]}\bar{x}_{[k]}\bar{u}^T_{[k]}.$$

That is, do not update correlation matrix alone!

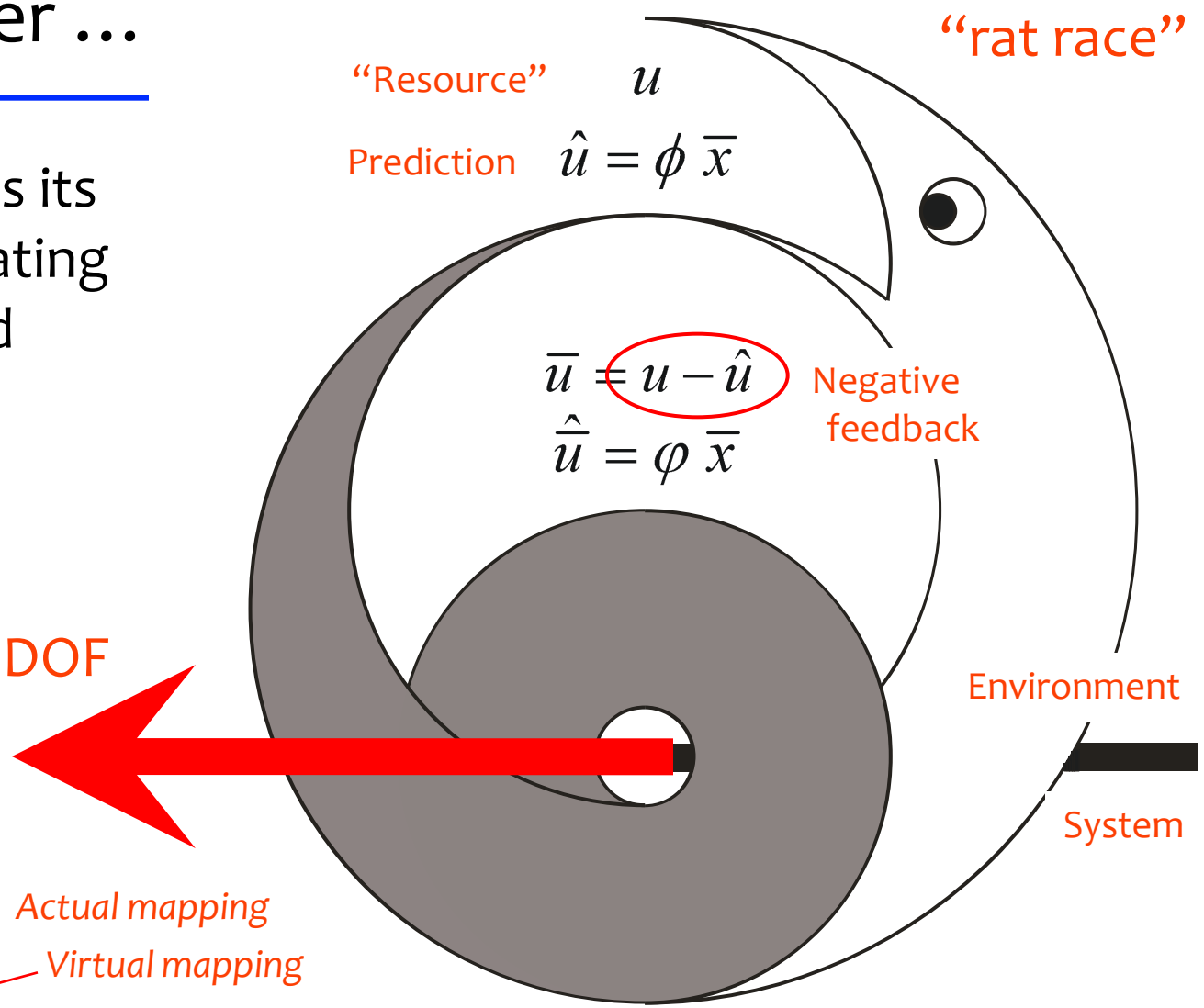
- In the real world there can exist structural nonlinearities
- As before: use nonidealities as a resource – to reach enhanced sparsity and convergence (theory is not changed)!

1. Rectification $x_i \geq 0$
   - Concentrations, frequencies, variances always positive, loops unidirectional
   - Why the model is still linear: inactive monads are temporarily excluded!
2. Bounded values $x_{\min} \leq x_i \leq x_{\max}$
   - Some computing elements, like neurons (?) can have limited capacity
   - But the variables stuck in constant values can be seen as external inputs
3. Reality (imaginarity) of signals $\mathrm{Re}\{x_i\}$
   - By appropriate construction, converged signals naturally have this property

Pheww … end of "theory"!

Will be met later …

- "Ouroboros" eats its own tail – eliminating its own livelihood



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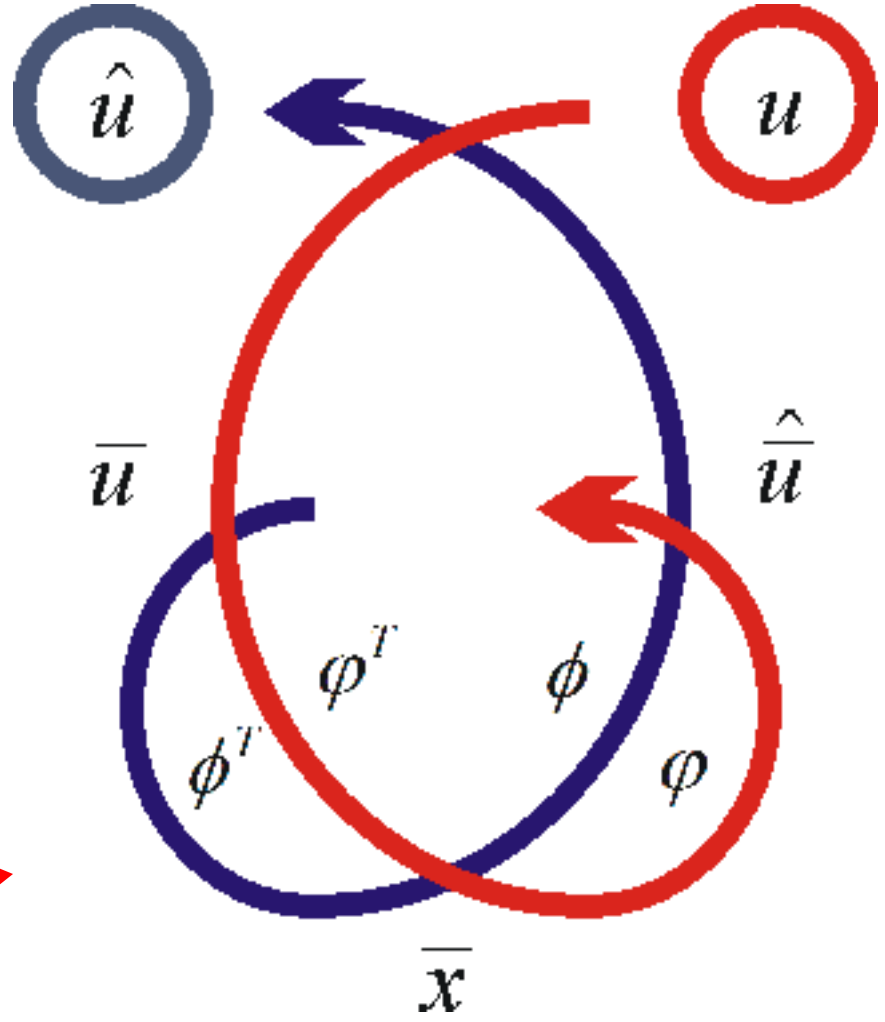
… Can this be a coincidence?

- There are always many ways to functionalize ideas
- However, applying the neocybernetic approach, there are astonishing coincidences:

1. General optimality reached (parameter estimation, …)
2. Intuitive "proof": just look at the symmetricity in the signal flow graph!



Loop back: "General theory of complex systems"

1. **Self-organization** – Kauffman's theory of autocatalytic sets is not enough: mastery of scales (emergence), mathematics (convergence analysis, compression, sparse coding) needed
2. **Self-regulation** – only then the "sticky tar" problem can be avoided: competition is the key point – seen as search for one's own room (this is related to evolution!)
3. **Self-evolution** – but not with straightforward "survival of the fittest": it is at system-level, symbiotic; the environment is constructed (semiosis + DOF's) applying one's own criteria!
4. **Search of SELF** – how to understand + then creatively escape the self-referential loops; how to outperform oneself finding new DOF's. *Without this all is too mechanistic!*

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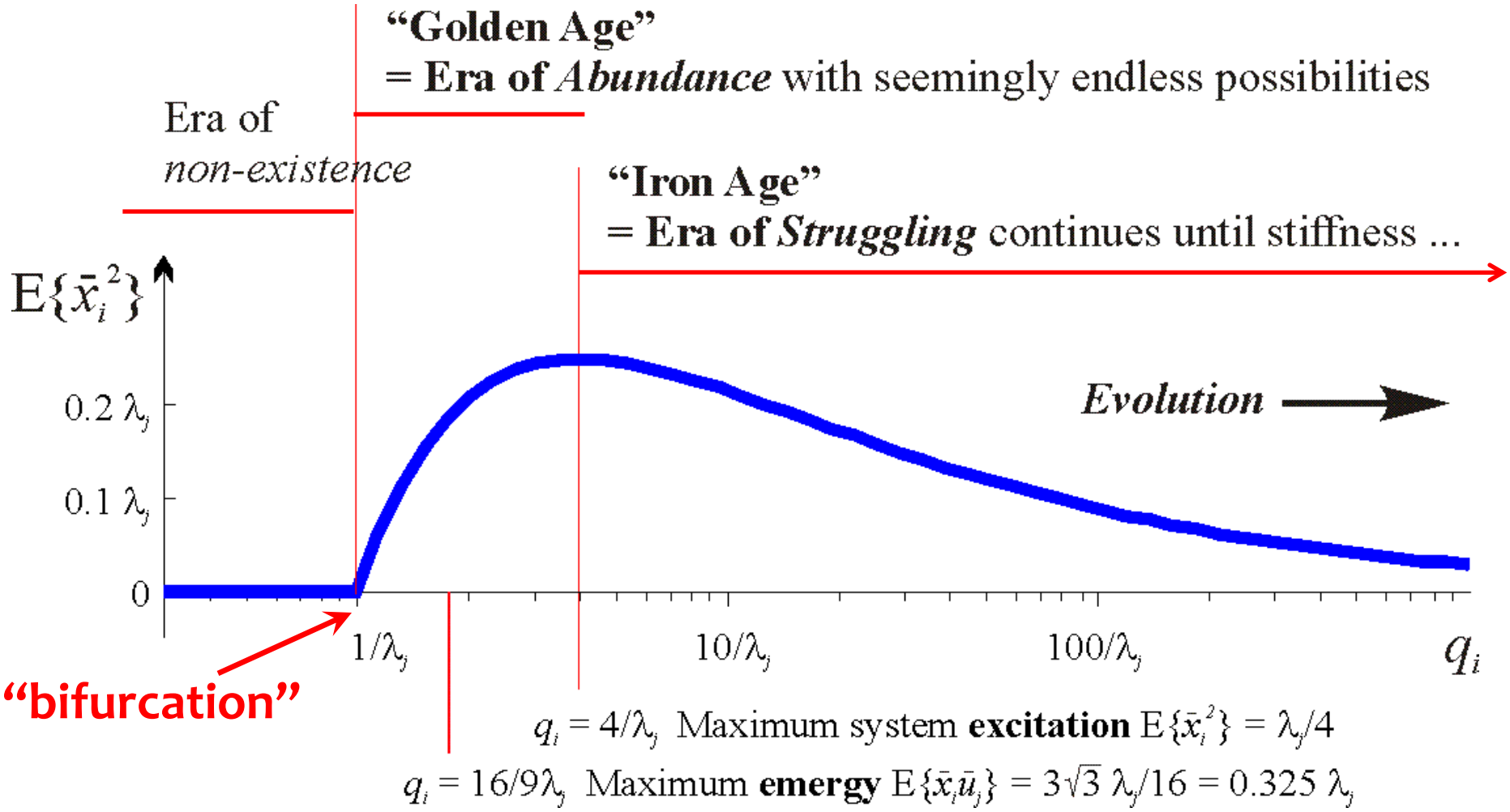
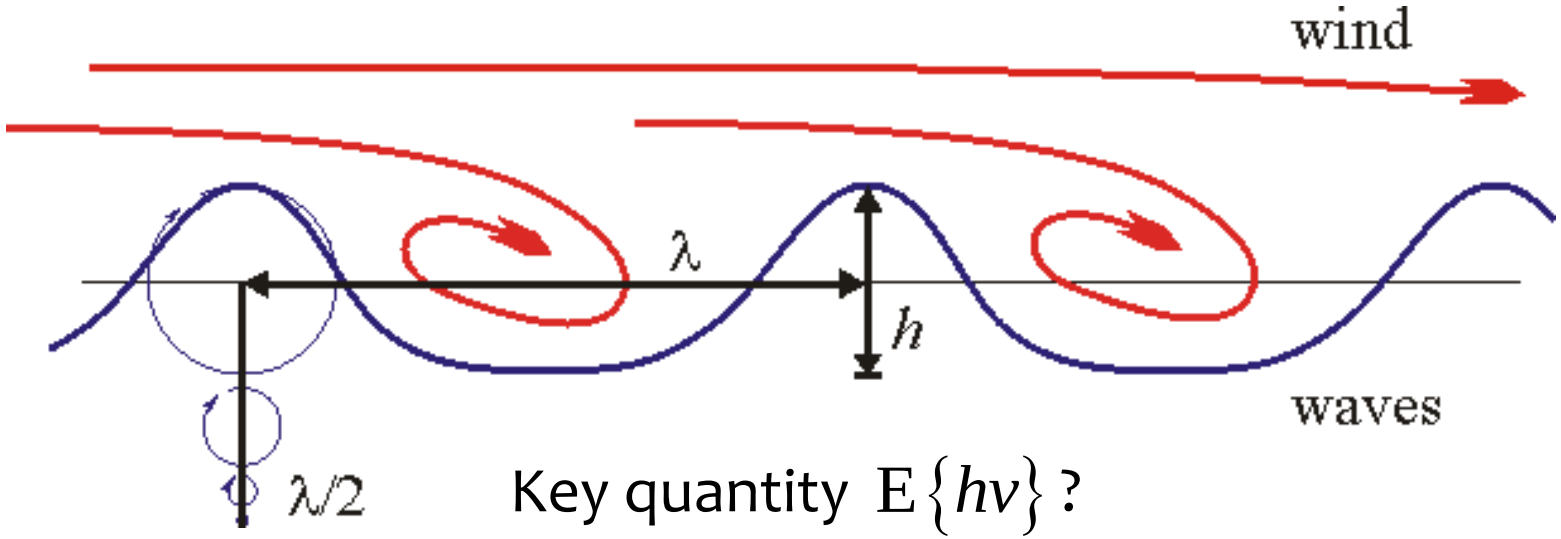
These are studied in neocybernetics,
the rest are still waiting for a theory!?

… No rigidity yet, still plenty of fun ahead!



Deeper intuition, coupling to reality = *examples*

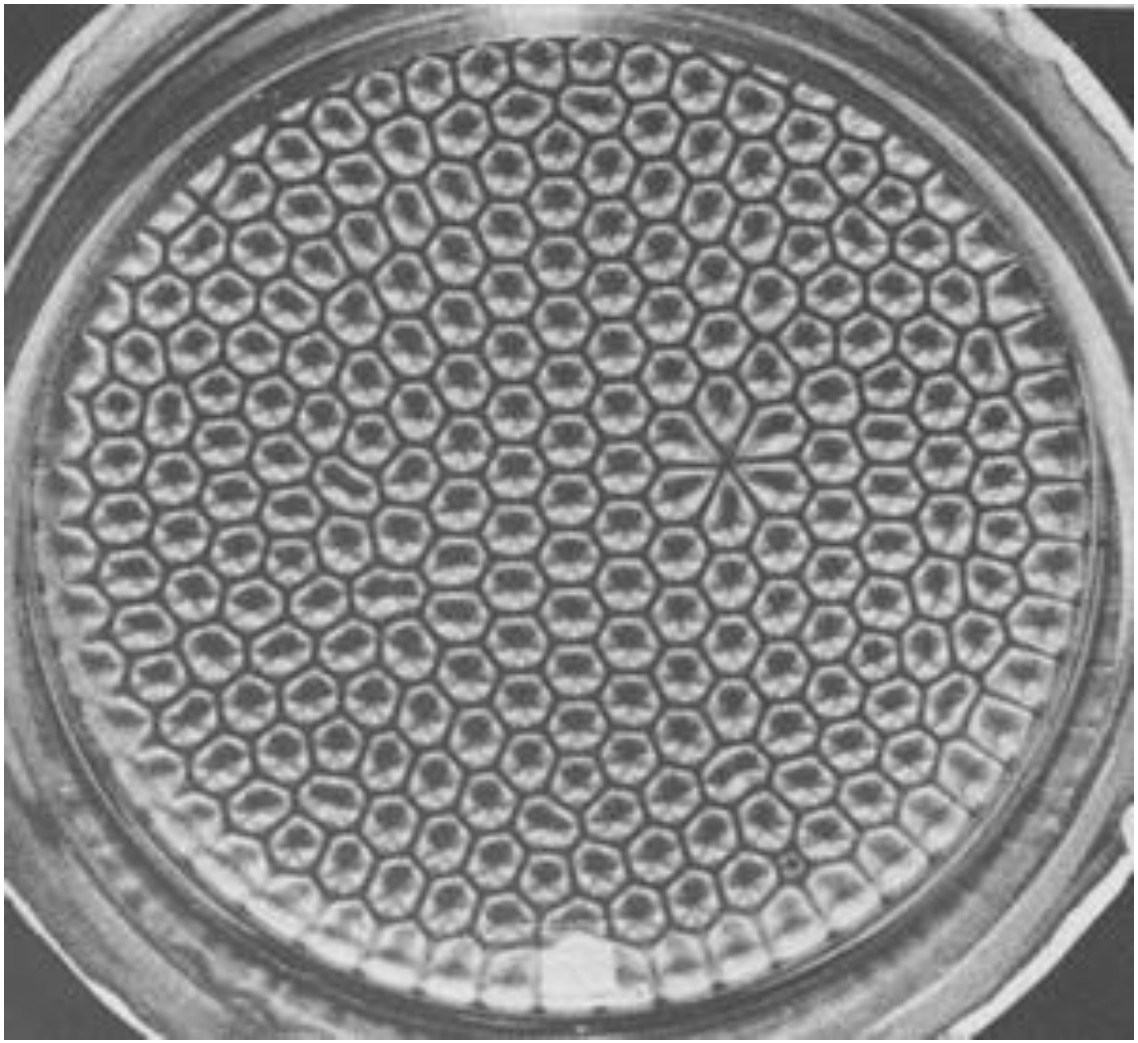
- "Higher-level modeling" attacking, for example, the *threshold* – qualitative vision reached without details!?
- Standard theory: wave energy related to h^2, wind energy to v^2 – these are the relevant emergies + system variables
- Learning: the higher the wave, the stronger the coupling!



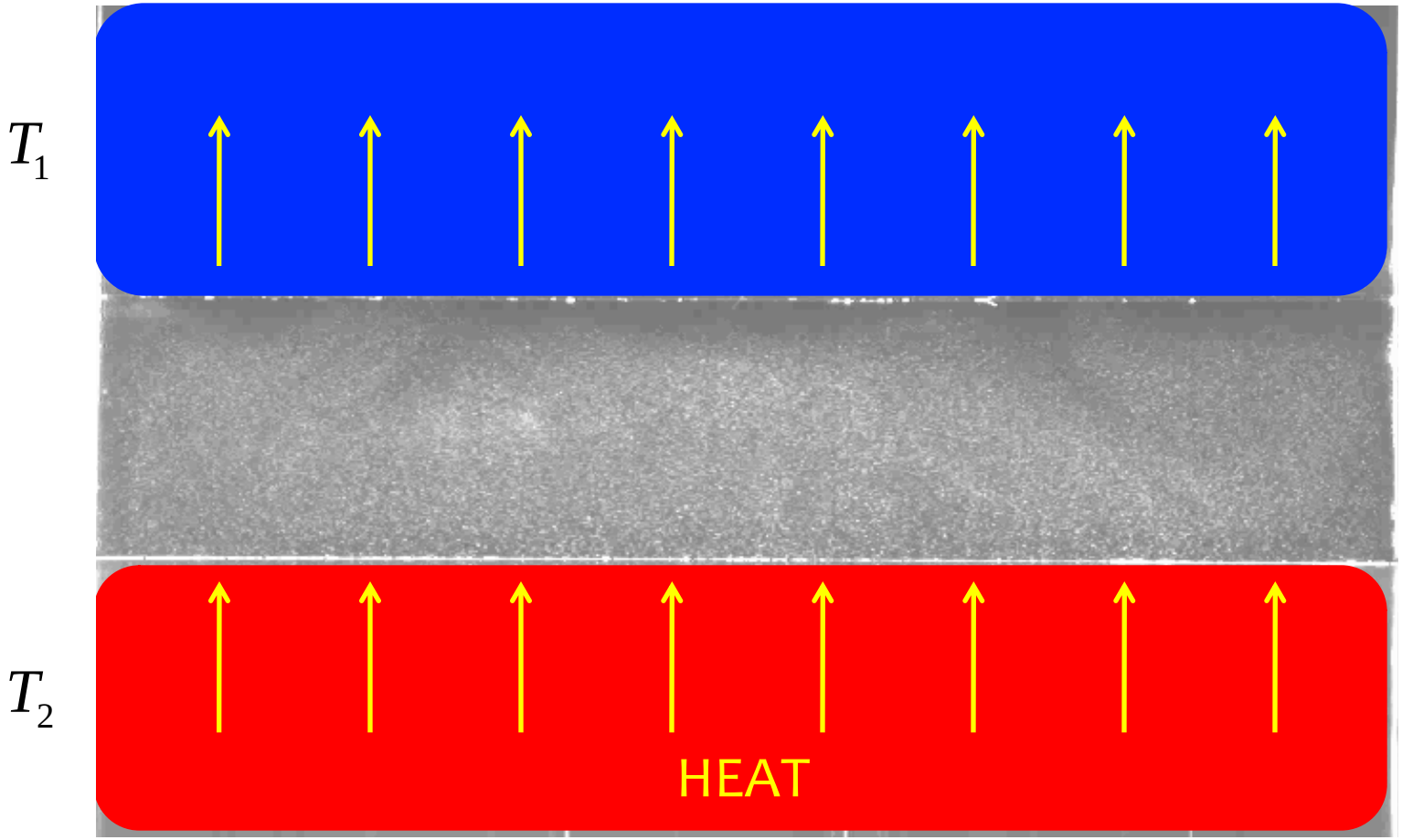
Key quantity $\mathrm{E}\{hv\}$?

Bénard cells

- Assume that a thin layer of liquid is heated from below
- Heating increases
- First, homogenous conduction of heat takes place …
- … But after a certain threshold, *convection cells* emerge!

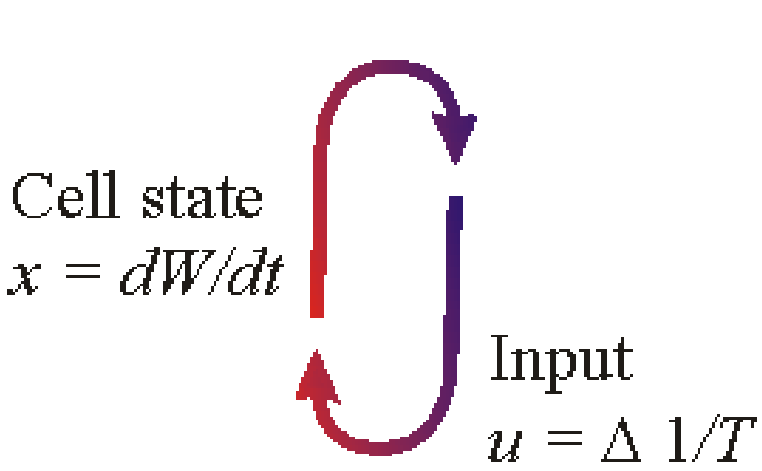


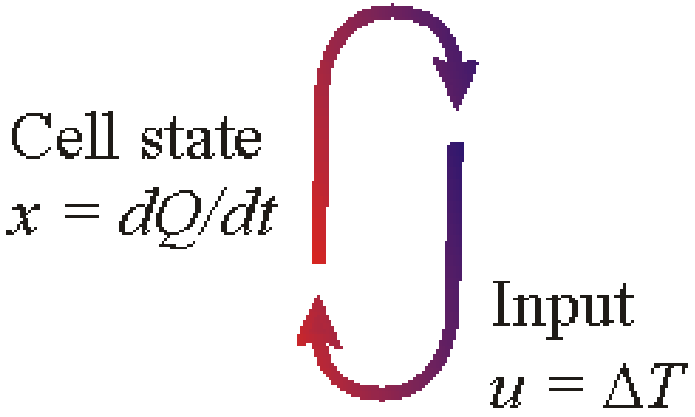
- Underlying random walks & turbulence supply “innovations”



- Entropy growth vs. dissipation:

$$\frac{dS}{dt} = \frac{dW}{dt}\left(\frac{1}{T_1} - \frac{1}{T_2}\right) \qquad \frac{dW}{dt} = \frac{dQ}{dt}\left(T_2 - T_1\right)$$





- Principle of simple "maximum entropy production" fails!

Higher-level views to old problems: *Ant paths*

- The wave systems, etc., seemingly could not evolve further – it is necessary to break to other physical domains!? – How?

- *Allocybernetic* actors NOT part of system, just carry signals
- For example: assume that the more there are ants x_i in the location index *i* the higher is the pheromone level there
- Further, assume that an ant secretes pheromones the more the more it is excited of food resource u_j it has found
- This means the ant *community* wants to find $\max\left\{\mathrm{E}\left\{x_i u_j\right\}\right\}$!
- One has strange "eigenpaths" characterizing the ants' world
- Inverse-square relationship governs the resource space – there is a relation to *celestial potential fields*

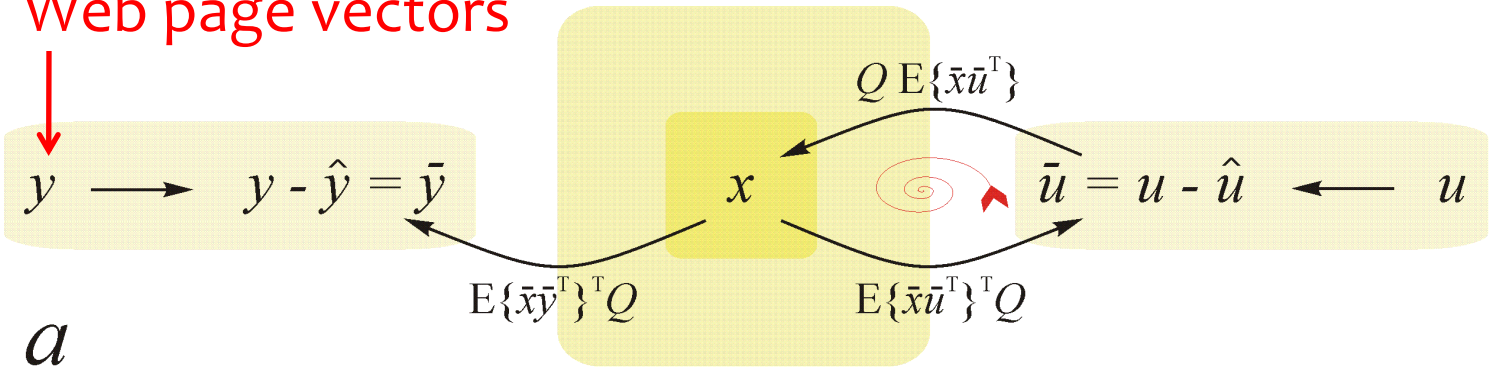
Not only for analysis but also for synthesis …

- Assume that (for some non-physical reason!) a web page tries to maximize its activity x_i = visits from outside
- Local optimization principle: try to enhance links from sites u_j that often are *popular* and are *related* – that is, $\max\left\{\mathrm{E}\left\{x_i u_j\right\}\right\}$
- This is the neocybernetic learning principle – one can see the final properties of a link system being adapted this way
- The DOF's determined by the "usage eigenvectors" span the structure of relevance to be used for *collaborative filtering*

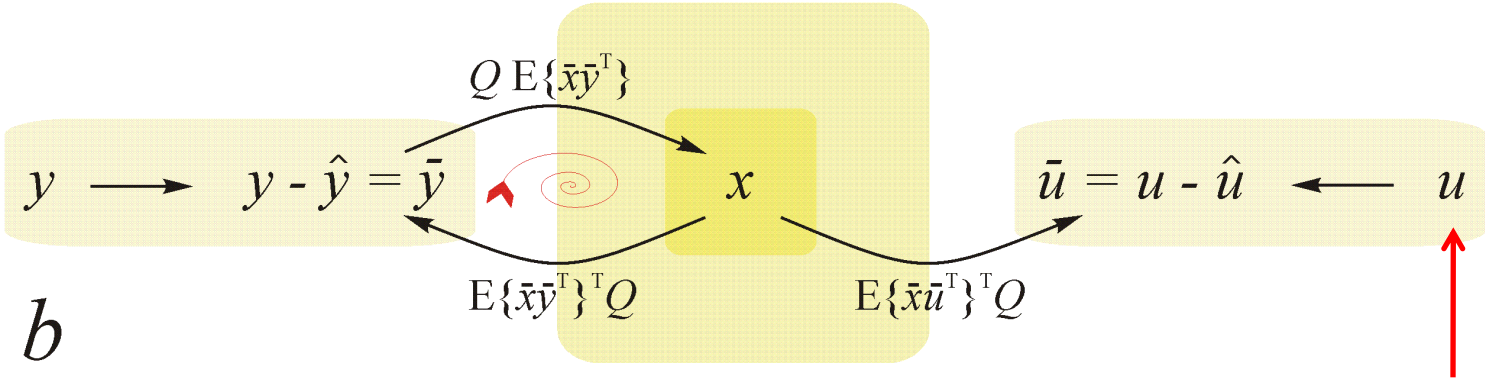
- In the PageRank algorithm that is used in Google, one applies similar eigenvector approach – not based on the actual use of pages, but using the formal link structure!

“Collaborative filtering”, etc.

Web page vectors



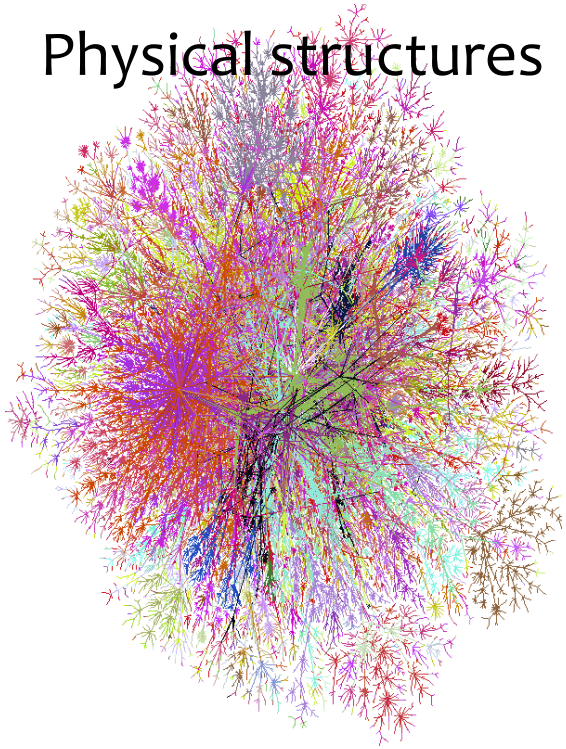
Learning the internal model = “balance patterns” between input and output



Search word vectors

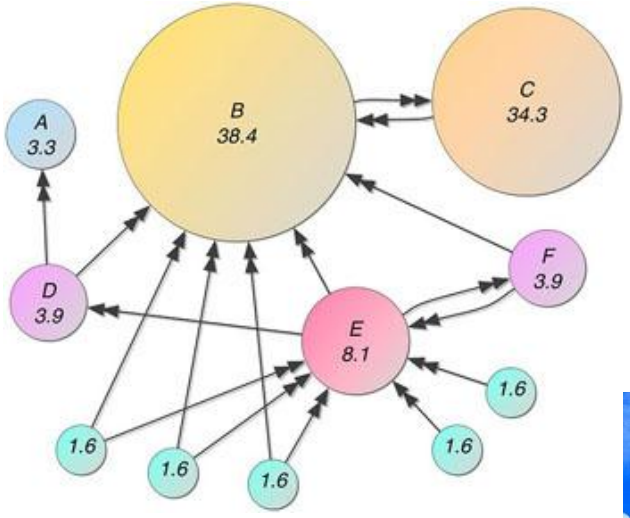
Towards higher-level views of all networks

Physical structures



Contextual semantics

Logical structures



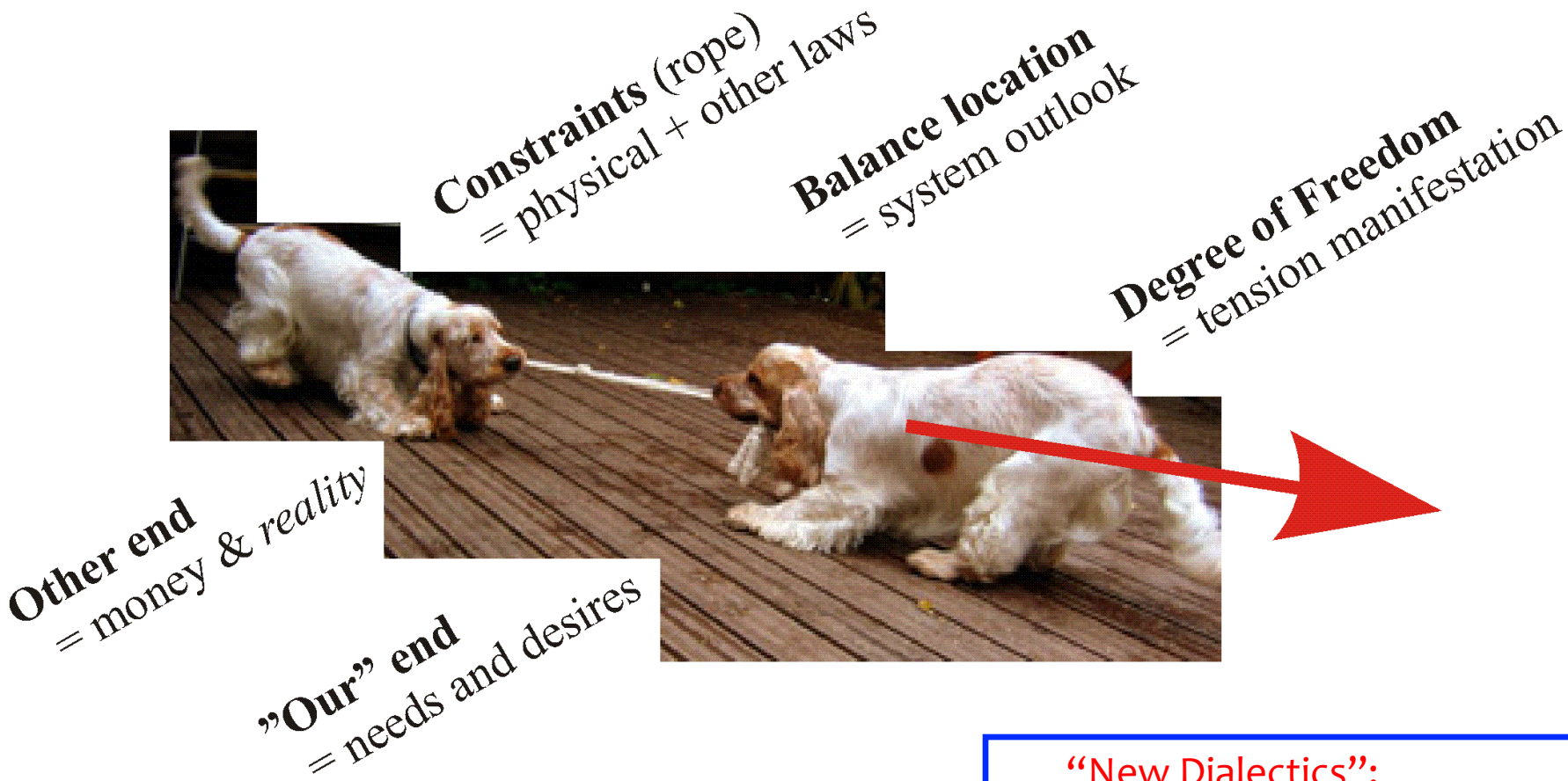
Pragmatic semantics

"Functional structures"

- From information flows to "knowhowflows"
- From constraints to *freedoms*

DOF's as the emergent model

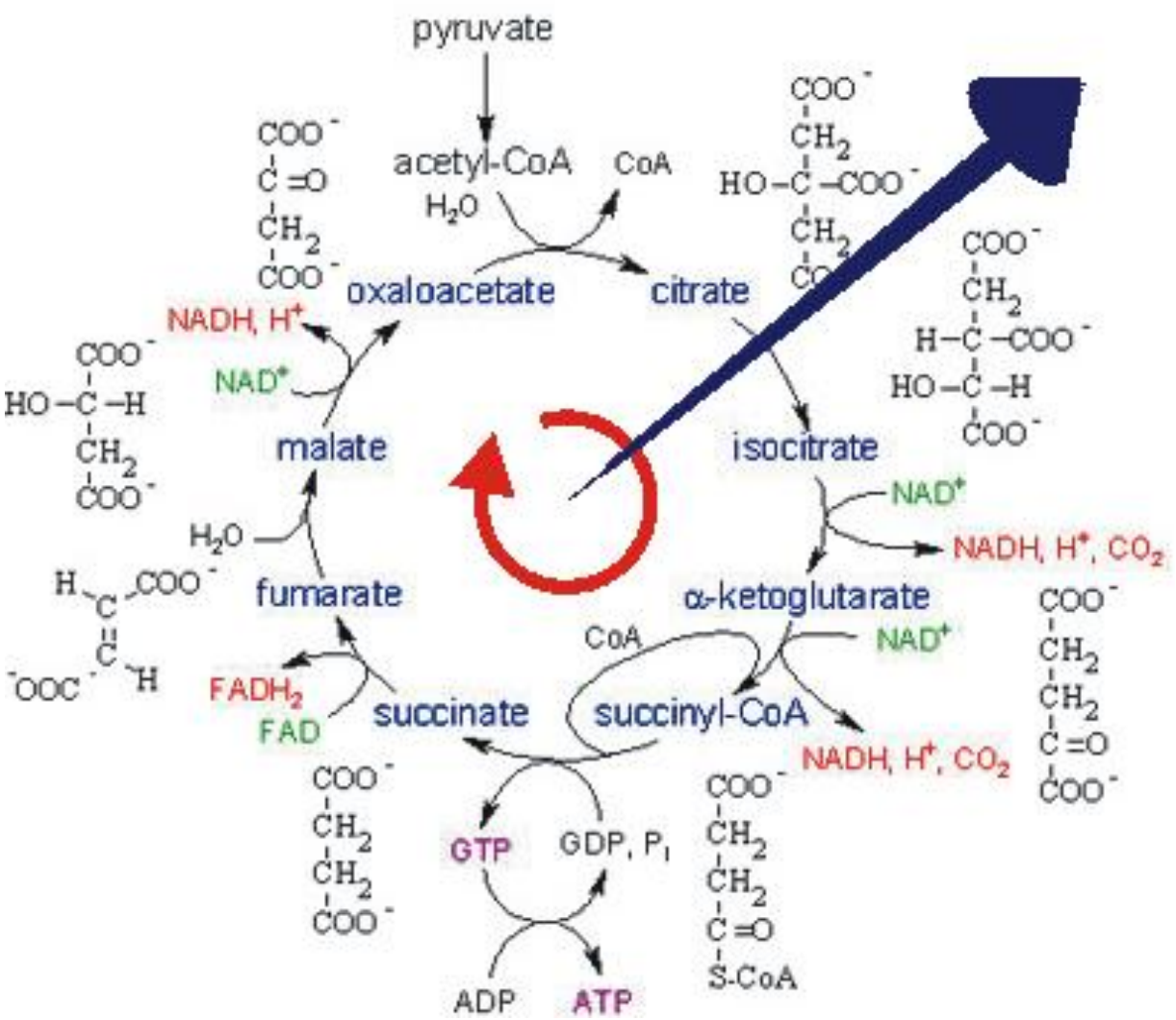
- Consider some technical development work:



"New Dialectics":

… Everything reduces to (continuous) dichotomies

Making DOF's understandable = exploitable?

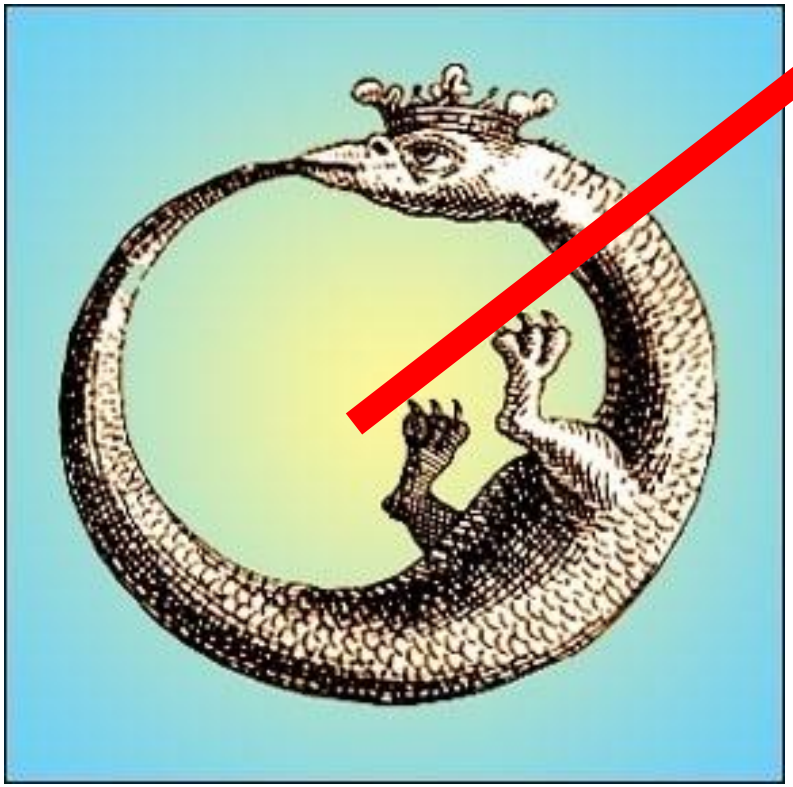


DOF variable = monad activity = *"rotation speed"*

Constraints = chemical laws fixed and rigid

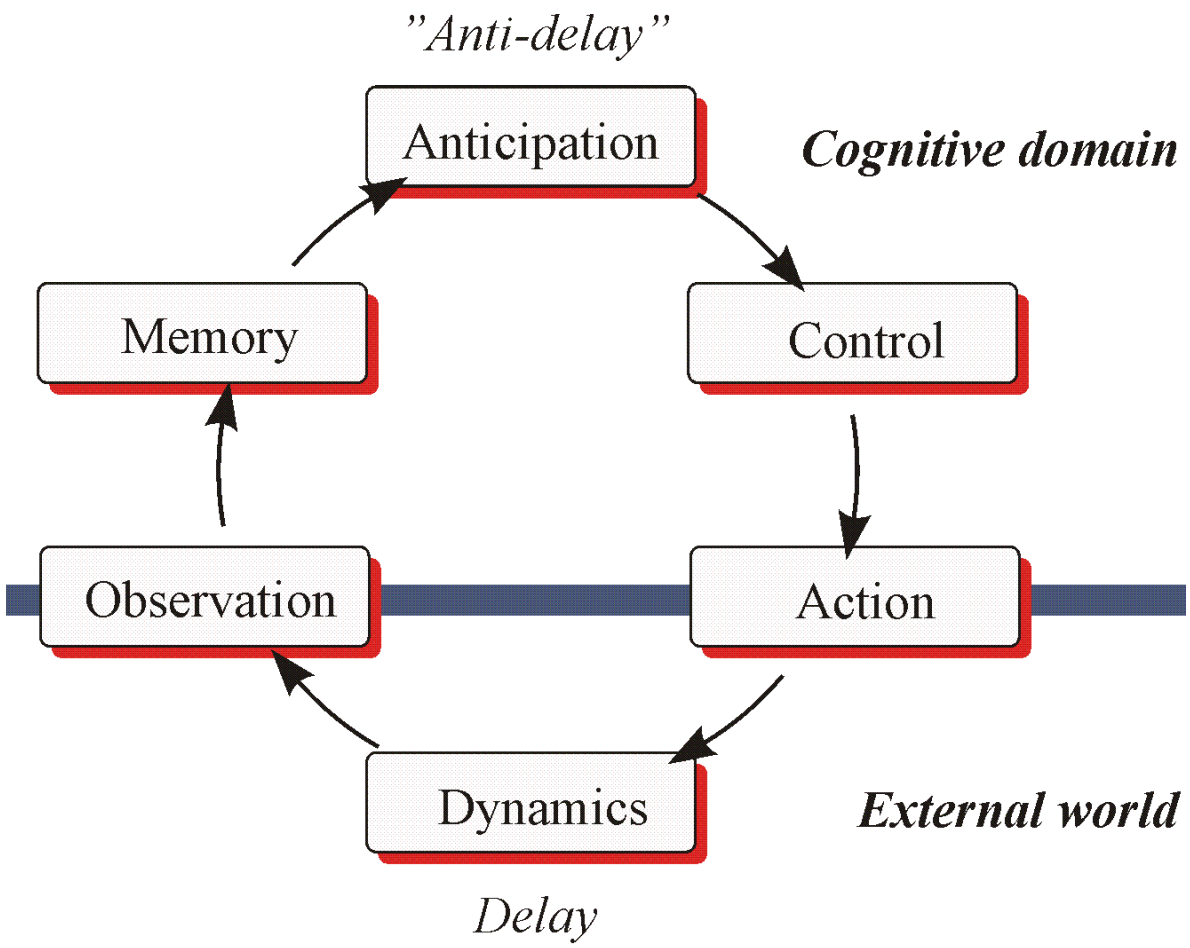
Loops can also have "infinite radius"

Axes of DOF's always defined through loops



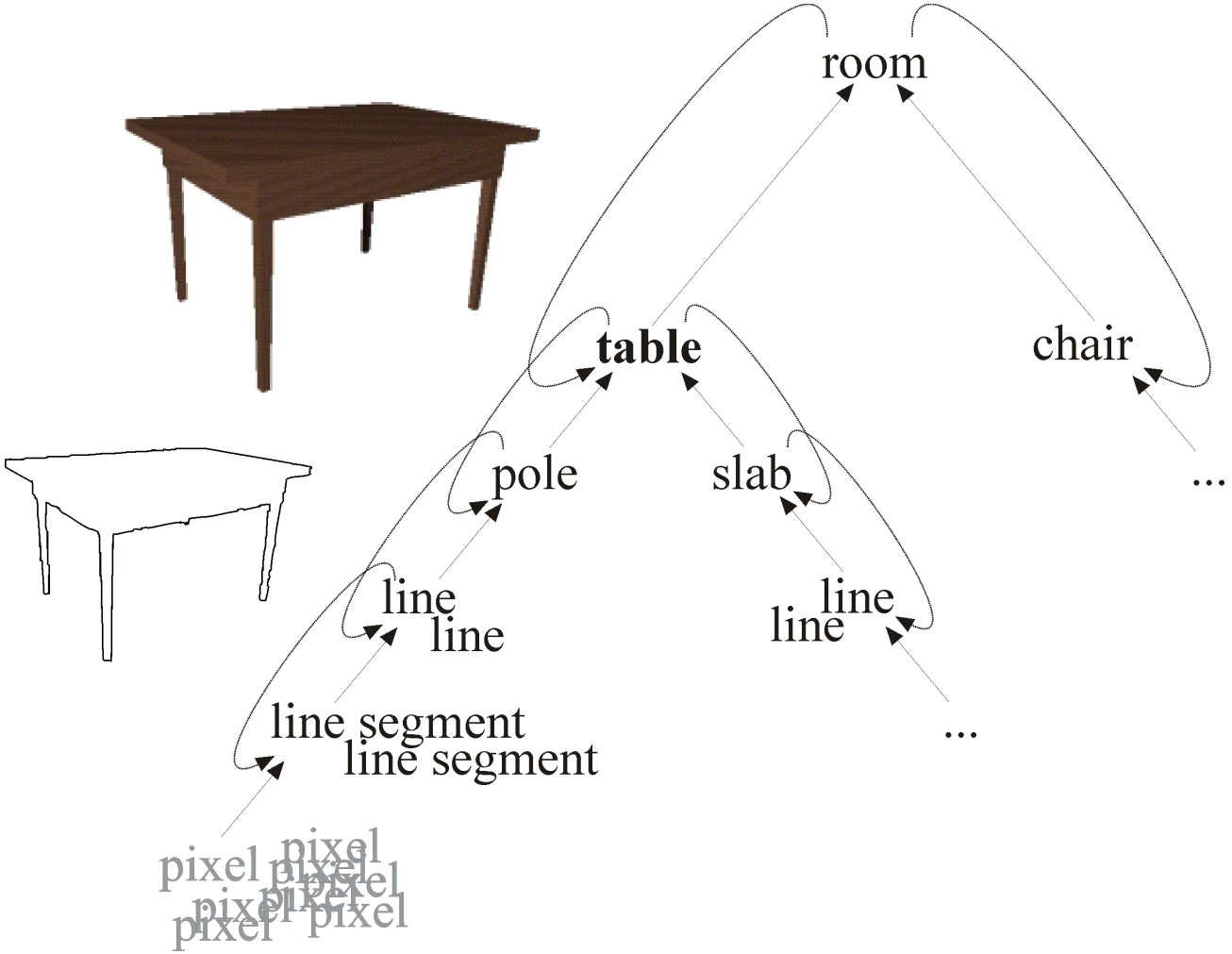
Similar loops in all domains – *cognitive system*

- Internal sub-loops make connection to environment more complete
- Longer loops: from implicit to explicit control, predictive loops, using scenarios and imagination



And loops inside loops …

- Connection to Markov chains with complex feedbacks



"Epistemogenesis" = emulating ontogenesis

Ontology = what there exists in the world

Epistemology = what a human can know about it?

- Heraclitus: "*The way up and the way down is the same …*"
- The mind has to instantiate the same attractors that exist in the environment to truly *understand* the domain
- This has to be based on the observation data alone
- Neurons are versatile, but … how to assure the possibility of a "domain shift"?
- What kind of shifts are possible in the neuron system? …

How to formulate the phase & frequency domain models?

Further symmetry: extension of the framework

- First observation: when the coupling is selected as Q_{opt}, the variances of all $\overline{x}_i$ become the same as the variances of all $\overline{u}_j$ – that is, all variables get equalized, there is full *symmetry*
- This means that the system state x can be *collapsed* with u, so that systems can be seen as inputs to other systems, and *chains of activity* can be formed
- Because coupling keeps variances constant, it is signals that "bounce" on this homogeneous medium – net becomes like a *trampoline*, and the chained system has special properties
- As evolution tries to reach constant stiffness & "empedance" among subsystems, it turns out that there is optimum match between the subsystems and *maximum emergy transfer*

- Need some new algebra to manipulate and understand the properties of chained systems, and, specially, their *dynamics*
- To reach this, one can recognize that the Laplace transform connects *algebraic (static) expressions in frequency domain* and *linear differential (dynamic) equations in time domain*
- This brings *complexity* with imaginary unit i in expressions; all transpositions T need to be changed to hermitean H's!
- Division by $i\omega$ corresponds to integration; this can be seen to happen in the "slave system" where growth towards its final value determined by the "master system" is exponential
- On the other hand, in some cases it can be assumed that there are two integrations in the loop …

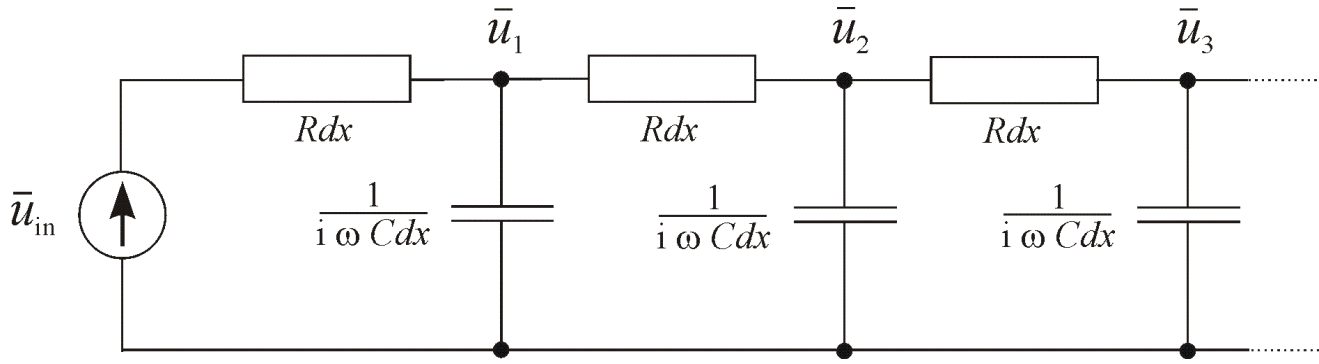
Complex tasks, complex numbers!

More analogies: modeling system chains

- RC analogy = single integrator: diffusion of inputs in the net

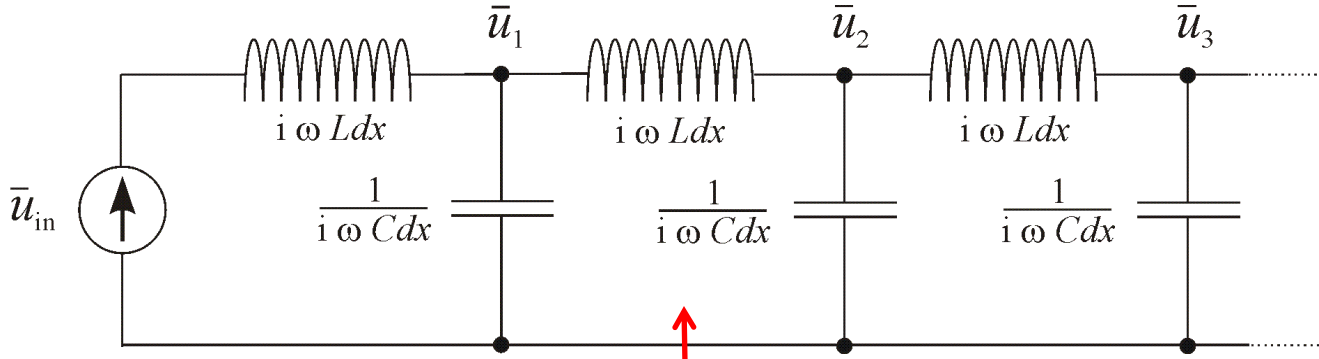
$$\frac{\partial u(t,x)}{\partial t} = D\frac{\partial^2 u(t,x)}{\partial x^2}$$

Where we started from!



- LC analogy = double integrator resulting in a *wave equation*!

$$\frac{\partial u^2(t,x)}{\partial t^2} = v^2\frac{\partial^2 u(t,x)}{\partial x^2}$$



Now, monads can be seen as "harmonic resonators"

Vibrations everywhere

- When escaping one domain for another (in autocybernetic systems) it seems that vibrations play a major role:
  - In molecular orbitals, level of "molecular algebra" was defined by frequencies
  - Observations reveal that phases are important among neural nets
  - And also in *steel plate analogy*, frequencies sound like a natural extension!
- To study the actual signals in systems, to attack real cases, this extension to Laplace domain seems necessary

  – but the only cost truly is that complex numbers are needed

$$\text{Characteristic empedance } Z = \sqrt{L/C} = Q_{\text{opt}} \mathrm{E}\left\{ \overline{x} x^{H} \right\} \approx I$$

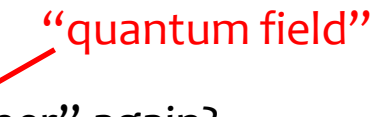
$$\text{(Normalized) wave velocity } v = \sqrt{1/LC} = I$$

These have to match in coupled systems!

… Remember also the "harmony of the spheres" …

One of those slides I should perhaps not show

- Where could the "double integration" come from?
- Assume that the system state is stored in the movement of a mass – as it is in the case of the electric field: the field causes acceleration (second derivative of location), and charged particle being accelerated further causes a field
- This raises new issues to be pondered:



  - Is the whole universe "cell-structured", is there need of "aether" again?
  - Photon is not a particle but a wave front in the "matter"-filled aether?
  - Is the wave-form structure of Schrödinger solution related to these issues?
  - Is there "cosmological evolution" of constants as manifesting *empedance*?
  - Specially, one can assume: the speed of light *c* has not always been constant – remember *inflation* in the early universe!

Another extension of the "mental filter model"?

- So … the lower, signal-level operation is based on

  $$\min\{J\}$$

- … but the higher, model-level operation is based on

  $$\min\{\mathrm{E}\{J\}\}$$

- When does the signal vector change into the model vector?

  … What if time-axis coordination (our final external control?!) is abandoned so that model and signal vectors of different subsystems can coexist, some $\bar{x}$ being interpreted as $\mathrm{E}\{\bar{x}\bar{u}_j\}$?

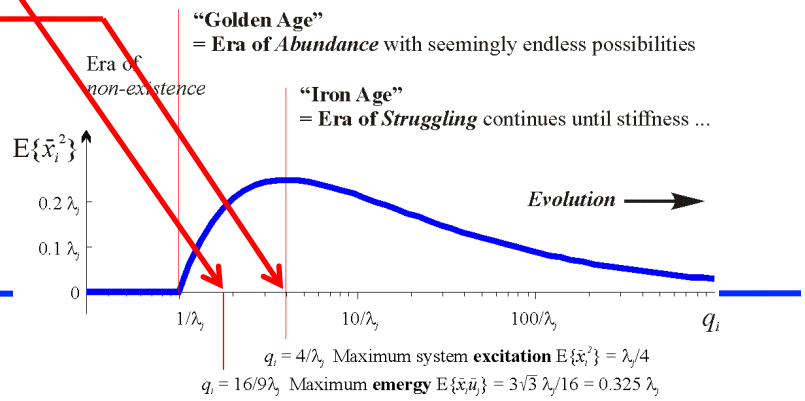
- … Systems act like "emristors", explicitly closing or opening signal paths, resulting in a true "computer metaphor"!?

… Towards new ideas: Emerging paradoxes

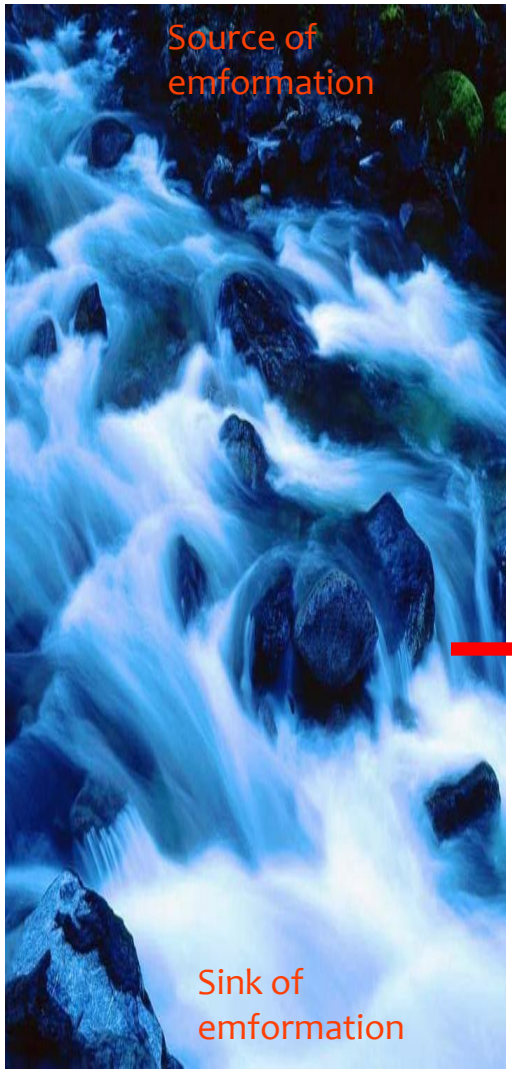
- Now when it would seem that everything is straightforward …

1. Systems aim at elimination of variance – but this results in turmoil, so that keeping stability is the route to catastrophes. *Cases of adaptive control presented before; the rest is new*
2. Gradient elimination results in *huge* gradients
3. Individual optimization in the "always behind the fence" style first goes beyond the ecosystem optimum and then beyond the system optimum

   … And everybody suffers!



"Paradox 2"

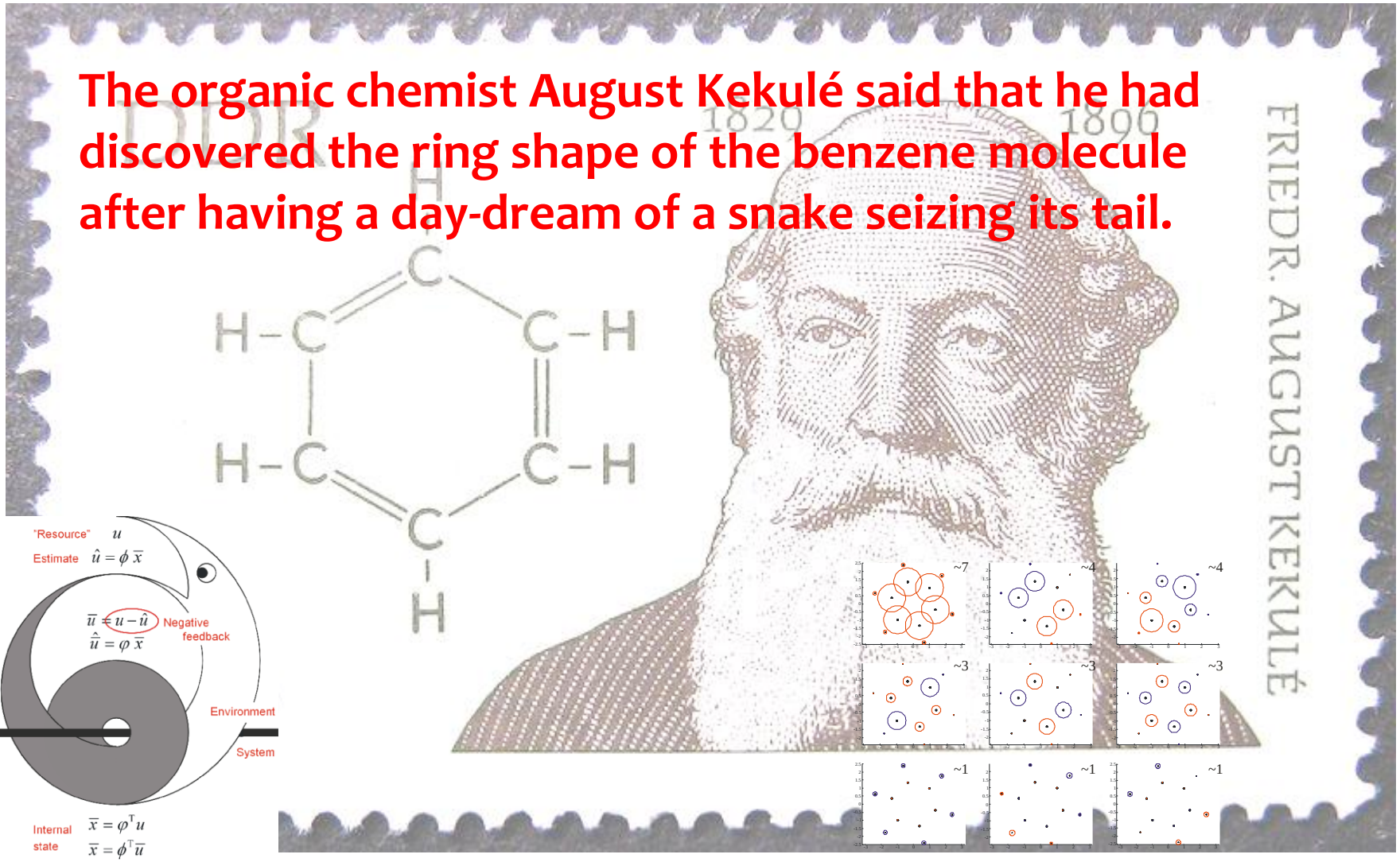


- The "rapids" are cleared to make flow more fluent
- … At some time, however, *dam* is built!

- *Extreme* gradient
- sparse coding of resources?

Do not underestimate the role of intuition

The organic chemist August Kekulé said that he had discovered the ring shape of the benzene molecule after having a day-dream of a snake seizing its tail.



“Heraclitean analogy” – *a river*

- Gaining intuition can be reached, for example, by *analogies*
- **How to find still more fresh intuitions?**

Other sources of intuitions

- Philosophies *sometimes* capture deep thoughts …
- Heraclitus' ideas were extensively exploited (exhausted?):
  - *Dynamic attractors*: everything changes but still remains the same
  - *Ubiquitous control*: how all things are steered by all things
  - *Symmetry of structures*: ways up & down are the same
  - *Continuums along axes*: notion on unity of opposites
  - *Role of conflicting urges*: strife is justice!
  - *Opposing tensions causing harmony*: aporias on *bow and lyre*
  - *Vibrations as the next level*: internal rhythm that regulates things
  - *Underlying élan vital*: *Lógos* or *fire* being the *primum movens*, …

… Aporias as interpreted in our framework!

- So, these all are already too familiar – how to find the new *differences that make differences*?

Kalevala (more slides better to be ignored?!)

- Kalevala is the Finnish national epic collected in early 1800's by Elias Lönnrot
- The stories were sung by wise men, and they had a very special verse structure that *cannot be translated*

- Originally, Kalevala was criticized because Lönnrot added verses of his own in between …
- … But this just means that Lönnrot was one of those wise men – Kalevala is living culture, it describes the world and our developing understanding of it
- *If you can say something better, say it – new myths are welcome, too!*


Ilmarinen


Väinämöinen


OH, BROTHER! WE'RE IN ONE TUONELA OF A MESS NOW!


Lemminkäinen

Kalevala – intuitions open only to few!?

- After all, science is *not* the only important thing
- Wider visions: not only try to understand nature in principle, but understand *LIFE* in all its diversity and nuances
- DOF's of human life – age-old trinity – three mighty men:
  - Wisdom (Väinämöinen) – To truly understand (but there are limits: women!)
  - Skill (Ilmarinen) – To be capable of really doing something of value
  - "Humanness" (Lemminkäinen) – Hubris and nemesis, punishment and mercy
- Everybody is needed to reach heroic achievements – or, at least, to experience something to remember and to tell on!
- Kalevala shows how to put fire in the memetic world: one needs human-scale analogies, mysteries, and *humour*

Starting point: “Antero Vipunen Hypothesis”

- Former “Pallas Athene Hypothesis” …
- More appropriate connotations now:

  Nature still has its secrets, and it will reveal them when you are stubborn and witty enough!

- Exercise your own Väinämöinen: it is you against the wilderness

- Kalevala offers a lot to think …

  Mysteries there are nourishment to imagination

> ”KIERTÄÄ PÄIVÄN, KIERTÄÄ KUUN,
> VAAN EI KIERRÄ **JUMINKEKOA**”…

- What is *Juminkeko* that one cannot get round?

  Is there some connection to today’s problems?
- Mysteries are open to interpretations … here we assume that Juminkeko is the *computational curse of dimensionality*
- Are there keys to problems? Tools to do *computationalism*?
- Claim here: the answer is the other great enigma, *Sampo.*

SAMPO systems*

- A neocybernetic system eternally grinds data – changing it into valuable *emformation* and, further, perhaps ”*em-knowledge*”
- Indeed, it is a kind of

  Self-**A**dapting **M**achinery **P**rocessing **O**bservations (and Producing Order / Providing Ontologies)

*In Kalevala, Sampo is the magic mill producing all kinds of wealth and wisdom

HELSINKI UNIVERSITY OF TECHNOLOGY
Department of Automation and Systems Technology
Cybernetics Group

Mighty songs still resonate

- New ideas are needed not only in science but in every day life and even in *ethics*.

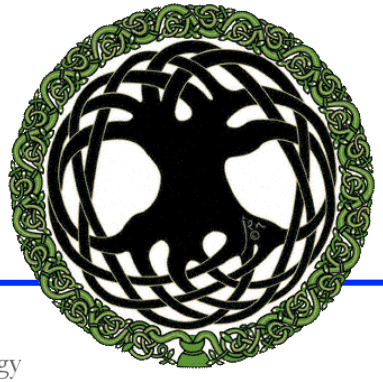
»Annapas ajan kulua,
päivän mennä, toisen tulla,
taas minua tarvitahan,
katsotahan, kaivatahan
uuen sammon saattajaksi,
uuen soiton suoriaksi,
uuen kuun kulettajaksi,
uuen päivän päästäjäksi,
kun ei kuuta, aurinkoa,
eikä ilmaista iloa.»

- One must have a “culture-level model” to match modern-day challenges about what is “good” and what is “bad”
- Ideologies, philosophies are needed again – or a religion?
  - *Science* offers no consolidation – human has no value
  - *Religion* is simply *not true* – human has *exclusive* emphasis
  - Some natural religion put “up-to-date” would be a good basis for a “human-sized” ideology again?
- Finnish mythology for the new era – some highlights:
  - Matches with sound reasoning and is open to new knowledge – and is compatible with neocybernetics!
  - You are part of infinity – do not cut the emergence process: your forefathers will not be happy if you ruin their heritage!
  - Avoid anarchy and apathy, always search for better but be prepared to fail!

- Then, according to cybernetism, what is the *purpose of life*?

  "TULLA KERRAN MAINITUKSI
  SUUREN VIRREN TUNTIJAKSI
  SYSTEEMEIDEN LOITSIJAKSI
  SYNTYSOINNUN LAULAJAKSI ..."

- Construct systems, promote diversity, enjoy life in all of its forms!



...
JA MINKÄ MÄ TAIDAN, JOS ELÄMÄ TÄÄ
VAIN MULLE ON SUURI RUNO,
MIHIN SAIMME ME LUOJALTA LANGAT VAAN
JA LUOJALTA KÄSKYN: PUNO!

ME PUNOMME KEHDOSTA HAUTAHAN,
ME PUNOMME, PURAMME JÄLLEEN,
KUNIS LAULUMME KUOLEMA KATKAISEE
JA SEN VIEMME ME VIRITTÄJÄLLEEN.

KUKA VIEPI VIISAHAN PÄÄTELMÄN,
KUKA PIIRTELI PILKKATAULUN,
KENEN PIVOSS' ON PIENIÄ RUNOJA VAAN,
KENEN KÄDESSÄ SANKARILAULU.

MUT OLKOON SE TUNNELMA, KOMPA VAAN
TAI MIEHEN MIETELMÄ SYVÄ,
RUNOT KAIKKI LUOJALLE KELPAAVAT,
JOS RUNO ON MUUTEN HYVÄ.
...

ME LAULAMME KEHDOSTA HAUTAHAN.
KUINK' KAUVAN, TIEDÄ ME EMME.
PARAS AINA OIS SOINTUNSA SOMMITTAA
KUIN OISI SE VIIMEISEMME.

– "LAULAJAN LAULU" BY EINO LEINO

“Laena mulle kannelt, Vanemuine!”

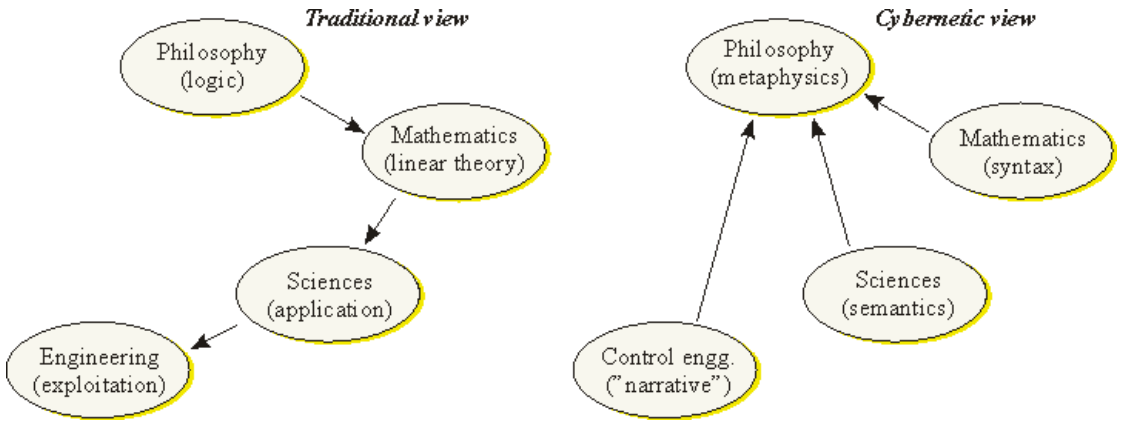
- So, promote systems and diversity – but do not mix them!
- One should say farewell to relativism – after all, everything is NOT equally good
- For example, if a cultural system has collapsed, it should be a warning: there is evidently no reason to copy it
- Everyone can deeply know and work for one’s own culture only – and it is right to be parochial
- The Finns can take it easy, as our culture is *good enough*. And getting ever better.
- How about all others? – Sorry … but you can learn Finnish?!

Life version 2.0

- Jyväskylä is the "Athens of Finland" (Akanaspolis) – Yes, there is *Agora*, too
- Let us see whether they are here ready to really face the Socratean method = pain in the ass in his electric moped!
- **Cybernetists – feel welcome to visit!**

So much to do before the optimum is reached …

- Philosophers would need *mathematics*
- Scientists would need *humble engineering-like thinking*
  Indeed, *electrical engineering*
- Engineers need *philosophy* – but *they already know that?!*



- … Finns – of course, yes, they need *Swedish*!

… And there is competition on the *agora*

- Year 2009 Sokrates Prize was given to Prof. Kari Enqvist
- These prizes are handed out by Skepsis ry (the Finnish sceptics society)
- Prof. Enqvist is a member in the advisory board of Skepsis (former president of it) …

- … He is one of those ”Men of Science” who never responded to my queries – such is Science.

Hauen leuan auon oion

- Hebbian agents: If there is deprivation (no response), it is clever to try make another difference that perhaps better makes a difference
- *Väinämöinen style* seems not to work, *Lemminkäinen* is not me
- Why not try in *Ilmarinen style*?

Make sure this will not happen again!?

SUUNI JO SULKEA PITÄISI,
KIINNI KIELENI SITOA,
LAATA VIRREN
LAULANNASTA,
HERÄTÄ HELÄJÄNNÄSTÄ:
»EIPÄ KOSKI VUOLASKANA
LASKE VETTÄNSÄ LOPUTEN,
EIKÄ LAULAJA HYVÄINEN
LAULA TYYNI TAITOANSA;
MIELI ON JÄÄMÄHÄN
PAREMPI
KUIN ON KESKEN
KATKEMAHAN.»
NIIN LUONEN, LOPETTANENKI,
HERENNENKI, HEITTÄNENKI ...

... ELKÄTTE HYVÄT IMEISET
TUOTA OUOKSI OTELKO,
JOS MA LAPSI LIIOIN LAULOIN,
PIENI PILPATIN PAHASTI!
EN OLE OPISSA OLLUT,
KÄYNYT MAILLA
MAHTIMIESTEN,
SAANUT ULKOA SANOJA,
LOITOMPATA LAUSEHIA ...

VAAN KUITENKI, KAIKITENKI
LAUN HIIHIN LAULAJOILLE,
LAUN HIIHIN, LATVAN TAITOIN,
OKSAT KARSIN, TIEN OSOITIN;
SIITÄPÄ NYT TIE MENEVI,
URA UUSI URKENEVI
LAAJEMMILLE LAULAJOILLE,
RUNSAHAMMILLE RUNOILLE
NUORISOSSA NOUSEVASSA,
KANSASSA KASUAVASSA.