EXTENDED LIFE

ikerbasque
Basque Foundation for Science

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ways to be an anti-Cartesian

Enactivism vs. the Extended Mind

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Enactivism vs. the Extended Mind

The Judean People's Front vs. The People's Front of Judea?

incompatibilities

- Enactivism: A framework propounding a continuity between life and embodied cognition.

- Extended Mind: A hypothesis about cognition spanning neural, bodily and extra-bodily processes.

- Wheeler (2009):
  - These two are incompatible. Enactivism implies that life and mind are co-extensive, life is bounded by the organismic membrane, so extended cognition is impossible.

- The conclusion is correct, but for the wrong reasons.

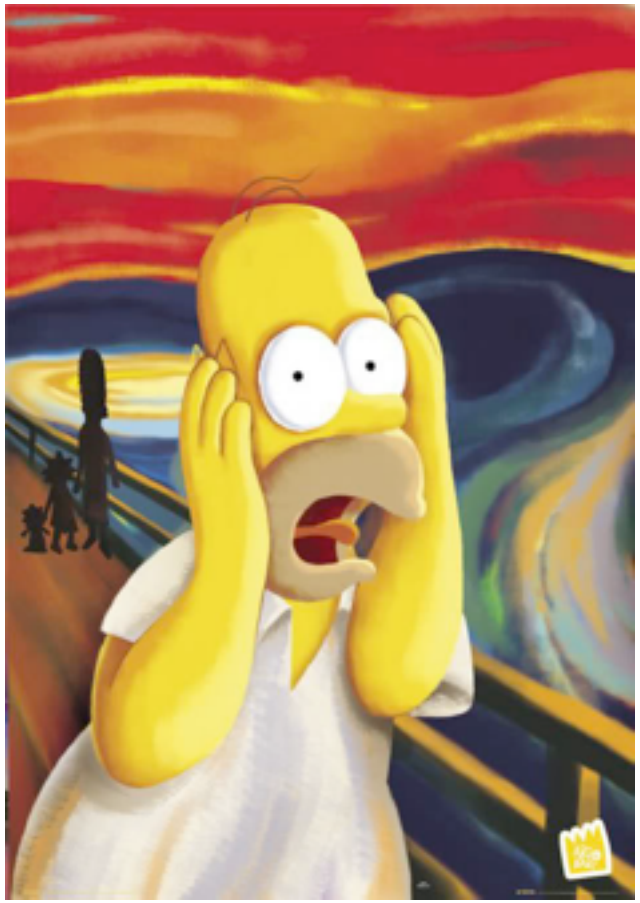
extended mind

- What's interesting about it.
- Mind-not-in-the-head
- (Potentially) Mind-not-in-the-individual
- Opens questions about the nature of individuality, technological extension and mediation, cultural institutions, ethical issues, etc.

the inner as regulatory

- What's wrong with the extended mind?
- Clark & Chalmers, 1998
  - Parity principle:
  - If a process is "cognitive" inside the skull, a functionally equivalent process outside the skull should be called "cognitive" too.

the inner as regulatory



- What's wrong with the extended mind?
  - A schizophrenic hypothesis.
    - Ignore the skull boundary! Not the mark of the cognitive!
    - Don't ignore the skull boundary! It will tell you what should count as cognitive!

extended mind as symptom

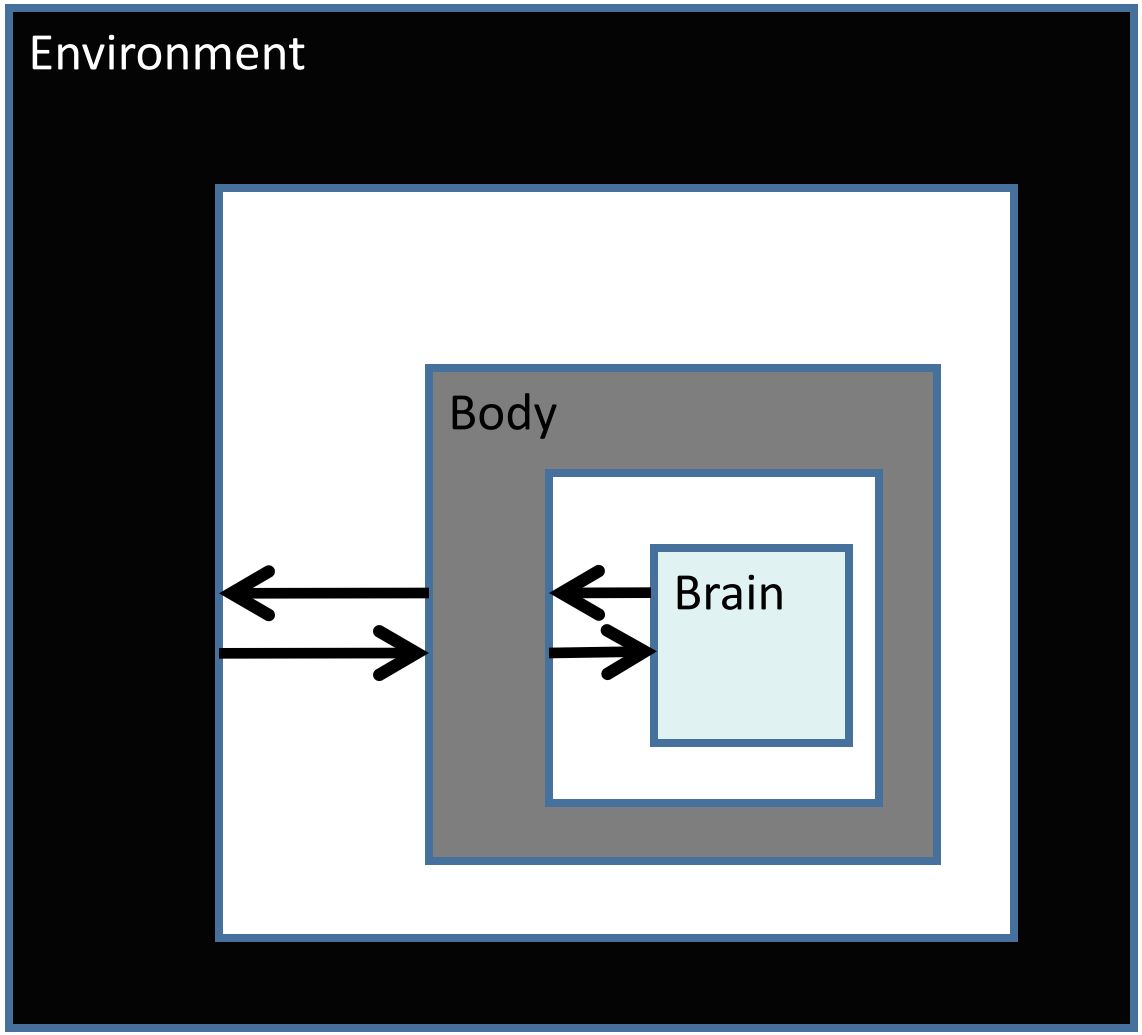
- The extended mind negates one assumption of functionalism, but attempts to recover a functionalist programme.
- However, negating this assumption (mind-in-the-head) puts functionalism in an internal conflict, by raising further questions: e.g., what counts as cognitive? what is a subject?
- EM is better understood as revealing a pathology.
- Wheeler is right: Parity principle only works as heuristic in the presence of a theory-loaded, locationally-neutral theory of cognition.

the blind-spots of functionalism

- Taken for granted:
  - The question of identity/individuation.
  - The question of agency.
  - The question of autonomy.
  - The question of meaning and value.
  - The question of temporality.
  - The question of experience.
  - The question of the self.
  - The question of sociality.
- These questions are never really investigated. The dominant functionalist paradigm in cognitive science is simply blind to them. No progress can be made within this paradigm if you don't assume someone already know the answers. You pass the buck (e.g., to evolution).
- Making science on credit

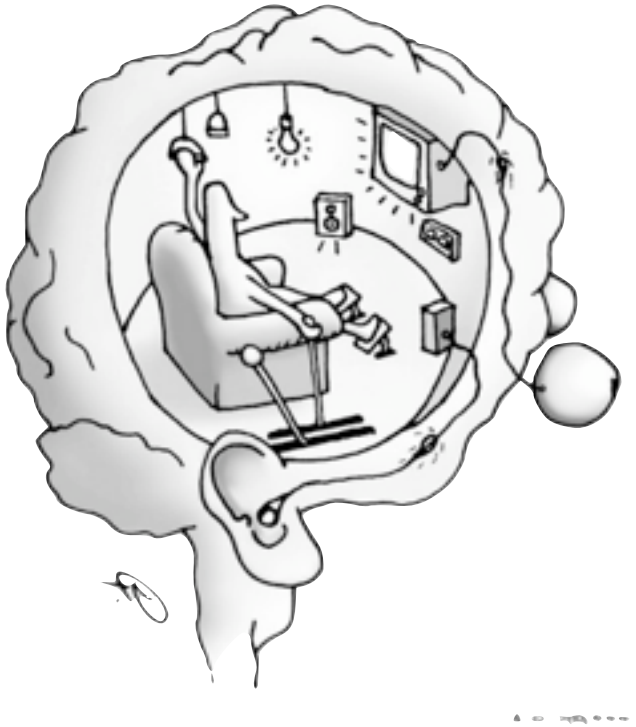
Perspectives on the body

shallow embodiment, the case for mind "outside the head"


Environment
Body
Brain

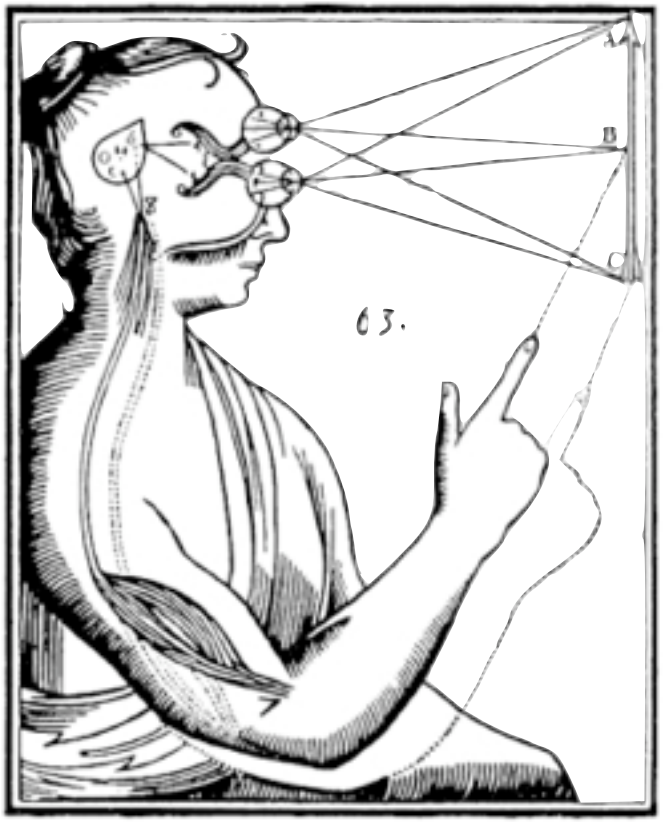
caricatures of perception

Cognitivism



caricatures of perception

Sensorimotor approach



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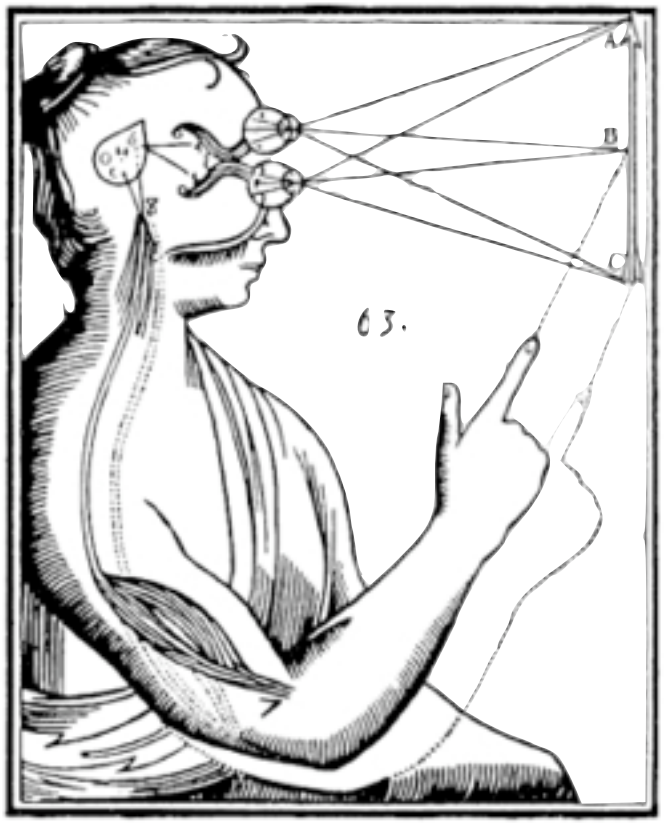
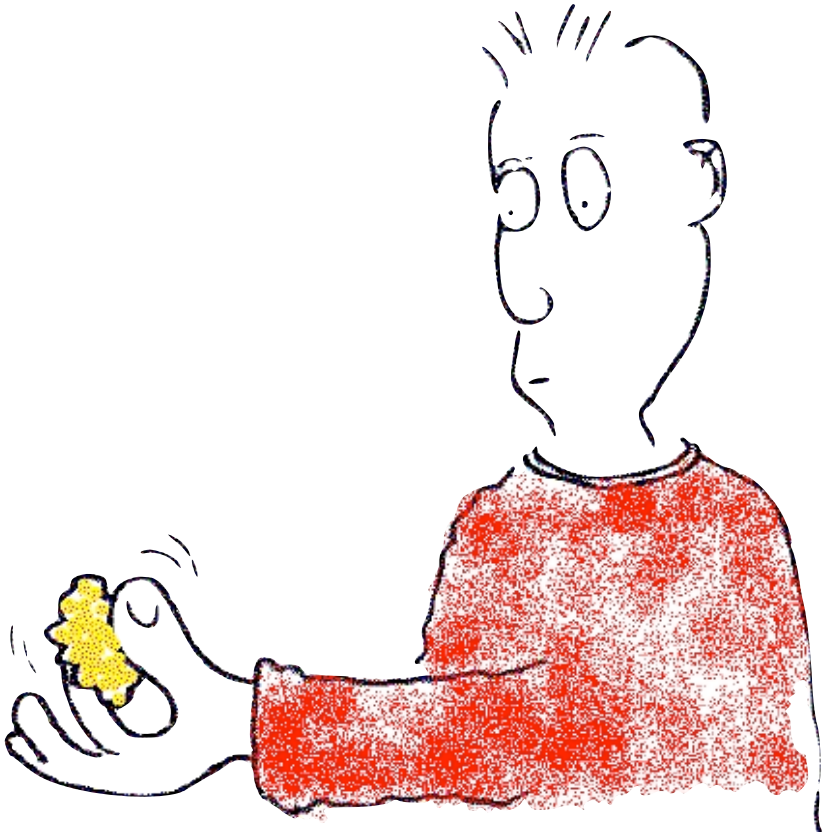
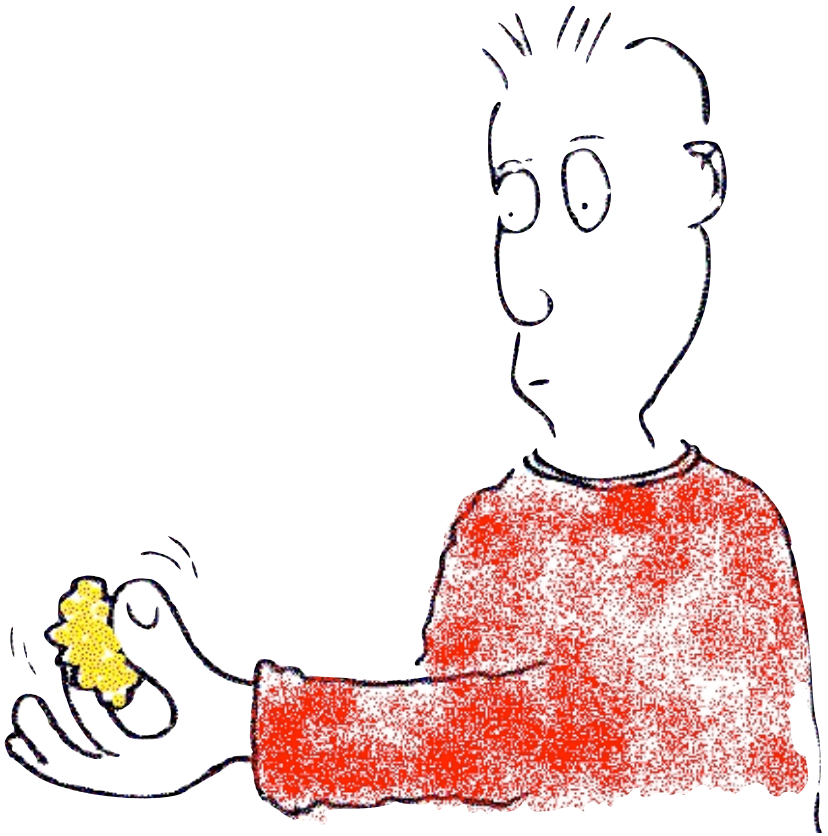




sensorimotor approach



- O'Regan, Noe, Myin, Hurley
- Perception is the mastery of sensorimotor contingencies
- Perception inseparable from action
- Bodily dispositions are therefore crucial

a more situated approach

- The "sensorimotor contingencies" (SMC) approach highlights the embeddedness of the embodied agent in its world. Objects are not perceived independently of bodily dispositions.
- Close to Gibsonian ideas.
- Perception is a form of *know-how*.
- *Zuhandenheit*

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shallow embodiment

SMC and similar approaches are said to be 'embodied'.

This is clearly so in that the particular details of the sensors and effectors, the bodily forms of self-coordination and coupling with the environment, all of these aspects matter because the laws of co-variation giving rise to SMC depend on them.

shallow embodiment

However, nothing prevents interpreting this form of embodiment in the same terms as Andy Clark: The body is a convenient and negotiable information processing device, a way of off-loading computation.

SMC is thus subsumed by functionalism.

deep lessons from shallow bodies

- Even though it may be subsumed by functionalists, shallow embodiment emphasizes several neglected possibilities:

- 1. Mind-not-in-the-head

- 2. Mind-in-time

- 3. Mind-not-in-the-individual.

The enactive approach

deep embodiment, continuities between life, mind and society

embodied experience of concern

- Hans Jonas: our experience of *concern* as embodied beings makes teleology undeniable, even if we couldn't reconcile it with efficient causality.

- The triumph of materialism achieved by Darwin is self-overcoming. Continuity runs both ways. If we are concernful beings, so can other lifeforms be. Where's the cut? Jonas says: *in life itself*.

- *Metabolism*: The material identity of the flowing matter does not coincide with the identity of the body or living *form*. Whenever that happens, the organism dies.

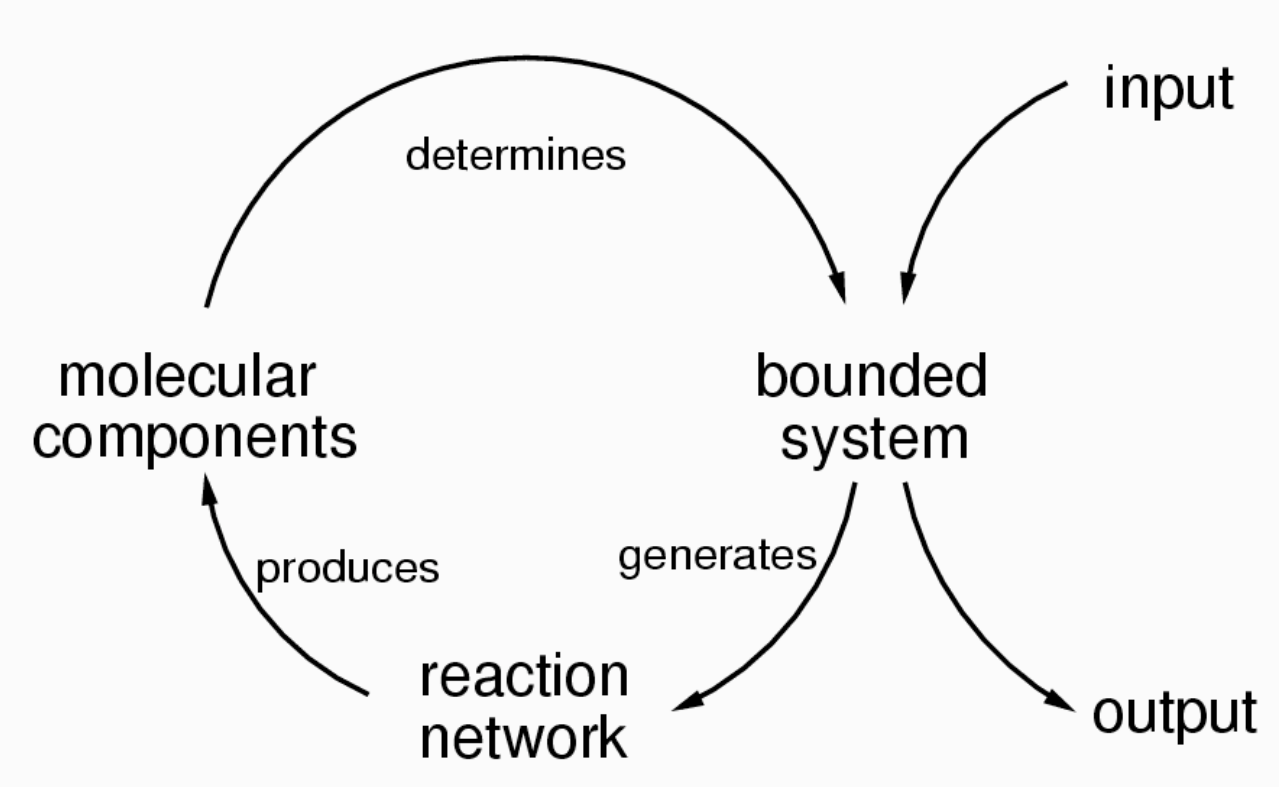
- Thus, an organism has a *formal* and *dynamic* identity, not associated with the persistence of matter.

- Mind in Life.

autopoiesis

Humberto Maturana and Francisco Varela (cf Canguilhem, Hans Jonas, Kant, Schelling, Hegel).

An operational definition of a living system.



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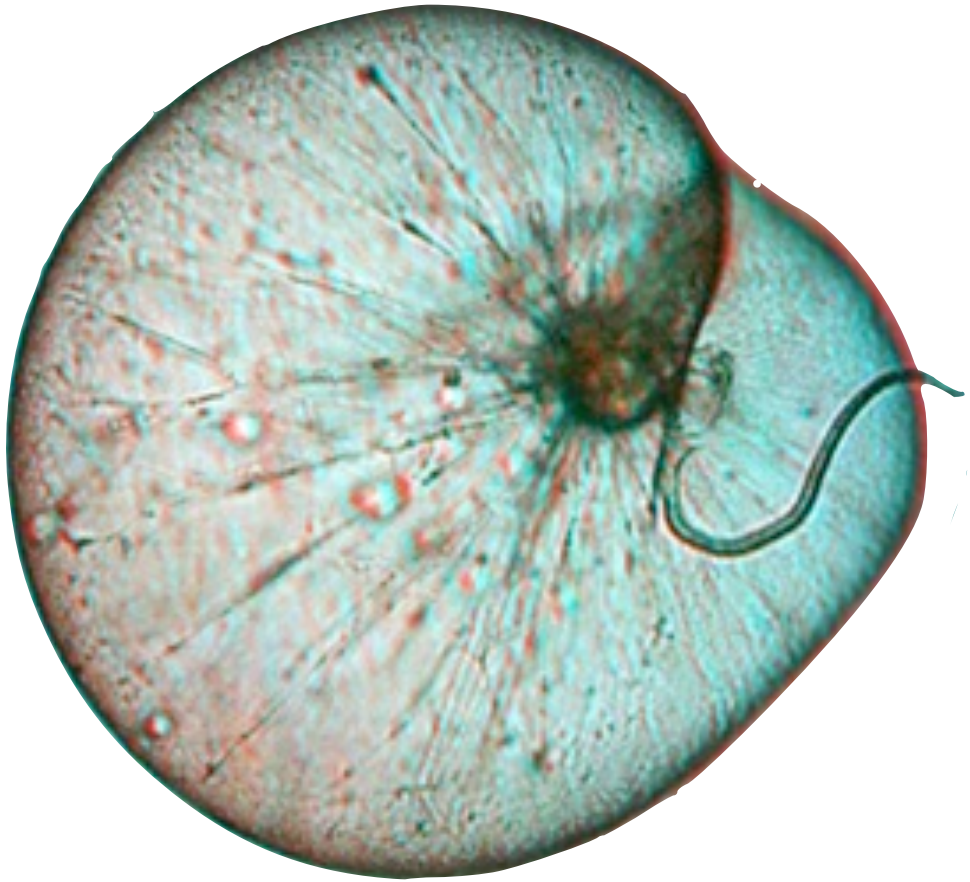

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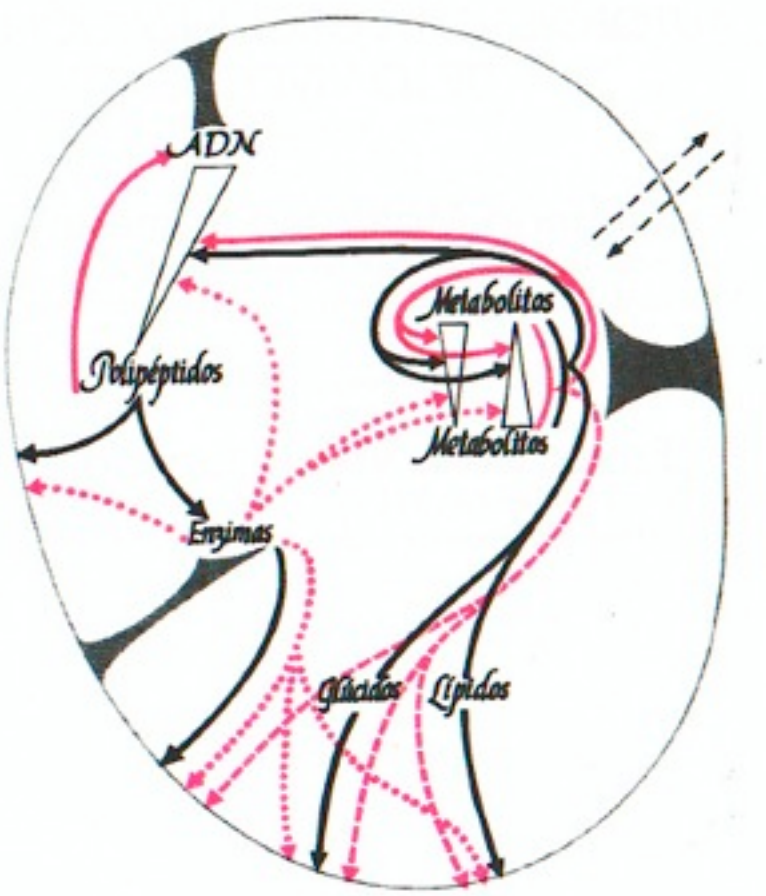

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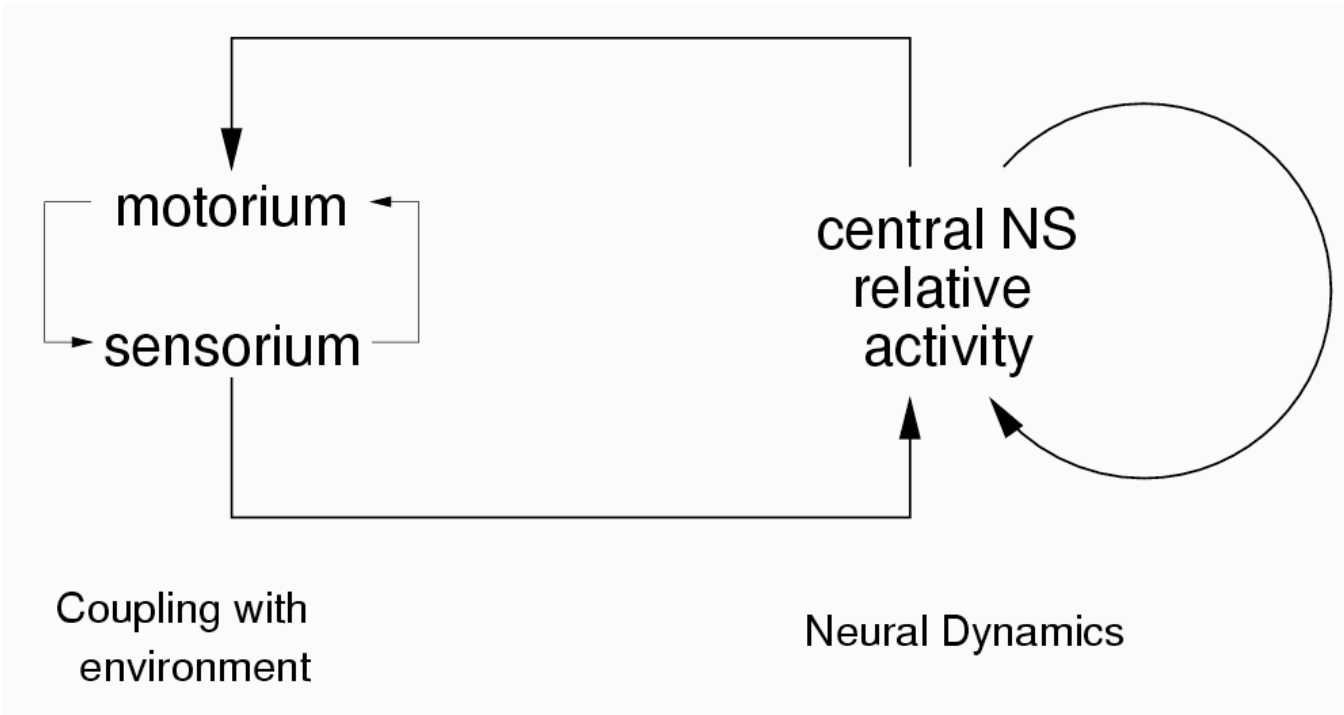


from autopoiesis to cognition

- The key element in any definition of cognition is a grounding of the notion of meaning (broadly construed as sense and value).
- Hans Jonas sketches a pathway from metabolism to mind.
- Weber and Varela (2001) attempt to provide a scientific ground for this idea in their proposal: autopoiesis ⇒sense-making.
- The proposal does not work by itself (Di Paolo, 2005) but can be rescued by the notion of *adaptivity*:
- Sense-making requires self-sustained identity + adaptivity.

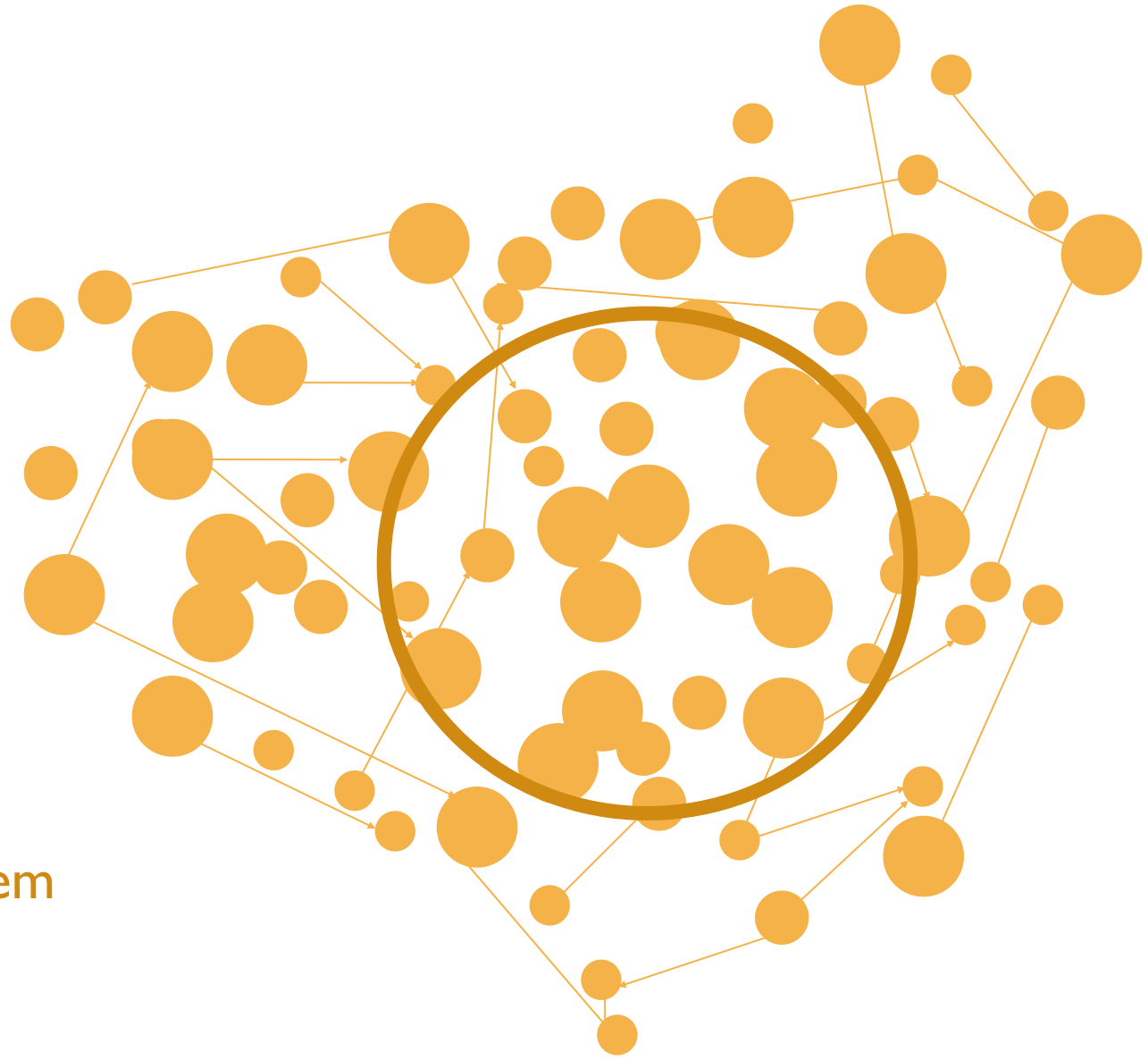
autonomy

- A cognitive agent is autonomous, it gives itself its own laws.
- How? Only by being able to affect its own constitution this is possible. Only a system able not just to modify itself, but to build itself as an entity.
- *A precarious, self-sustaining process of identity generation.*
- Classical example: autopoiesis, but others are possible.
- Mind has a proper, *irreducible* level, that of the autonomous cognitive identity (forget about *internal drives* and *stimulus-driven cognition*.)
- The question for cognitive science is now not simply *How does it work?* but also *What makes it a mindful system?*

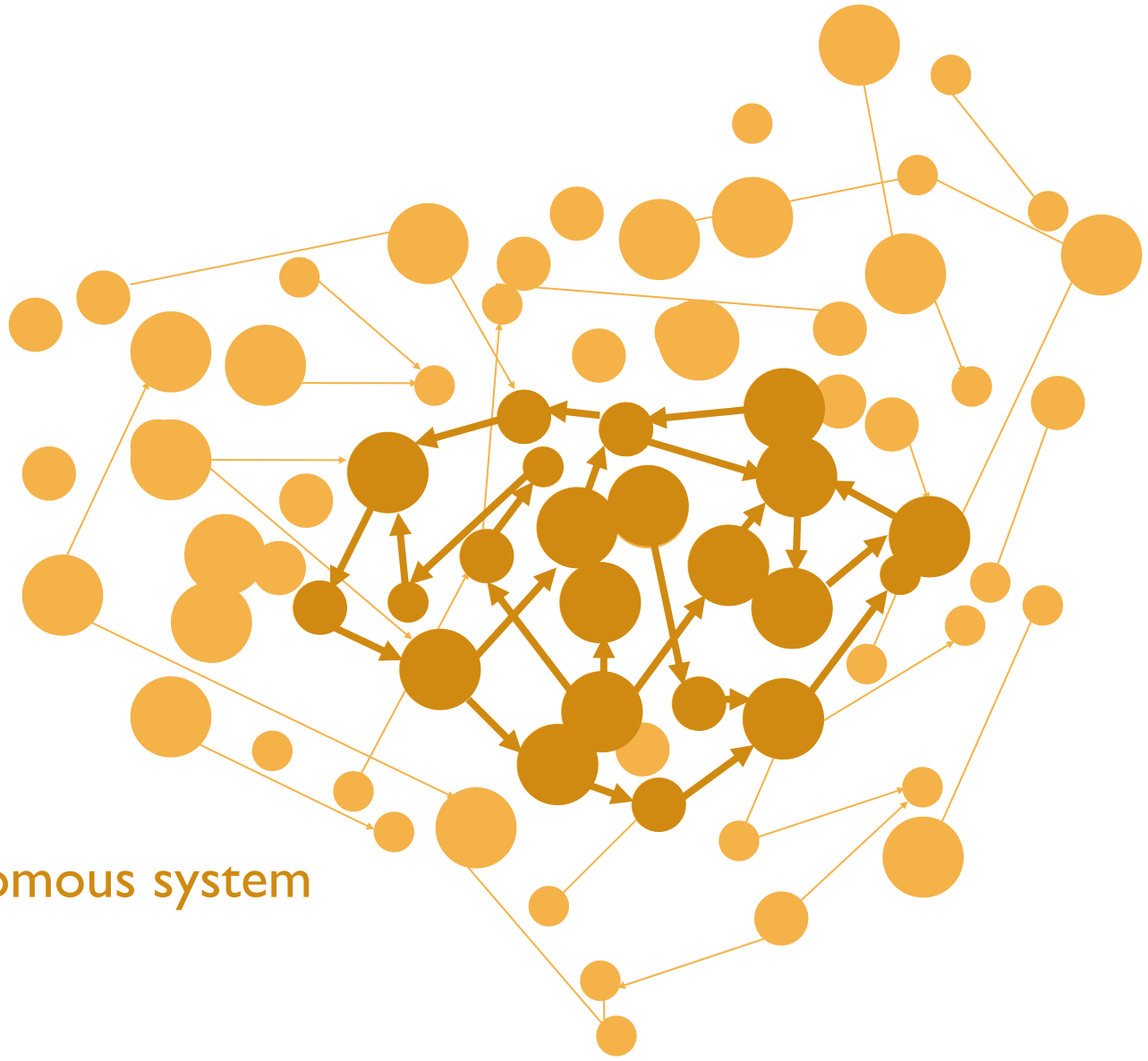
definition

definition

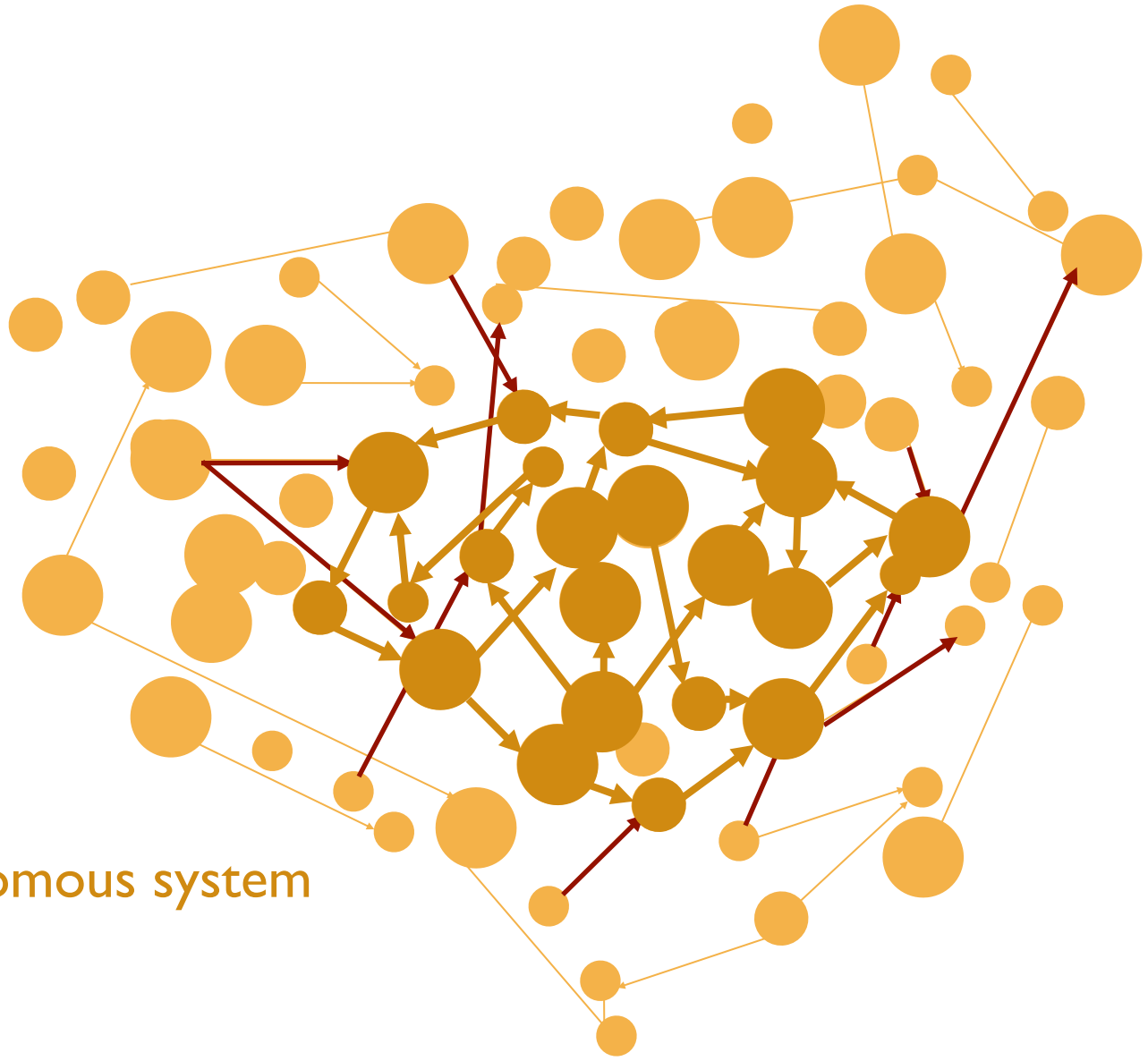
An autonomous system is defined as a system composed of several processes that actively generate and sustain an identity under precarious conditions. By identity we refer to the property of operational closure. Operational closure indicates that among the enabling conditions for any constituent process in the system we always find other processes in the system and conversely every process in the system is an enabling condition for some other process. An autonomous system is self-distinct, i.e., a process/component either belongs or not to such a network of enabling conditions. It actively affirming the identity of the system by its own operation. By precarious we mean the fact that in the absence of the organization as a network of processes isolated component processes would tend to run down or extinguish.



A system



An autonomous system

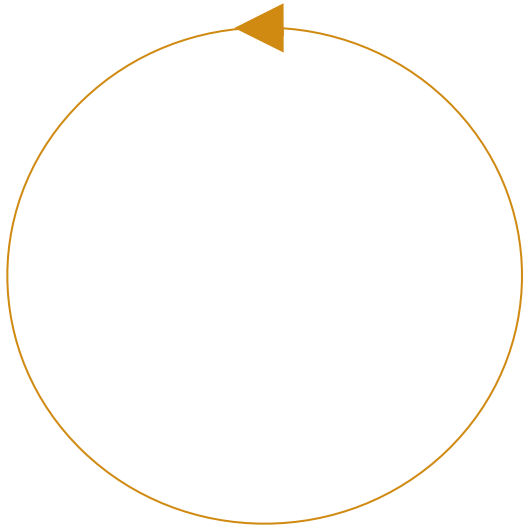


An autonomous system

precariousness

- Is an unavoidable aspect of living systems.
- It is not a positive property, but the lack of permanence of any positive functional property.
- It therefore cannot be captured in functional terms.
- Materiality enables sense.
- Vital materiality.
- Breakdown of the vehicle/content distinction.

a double negation



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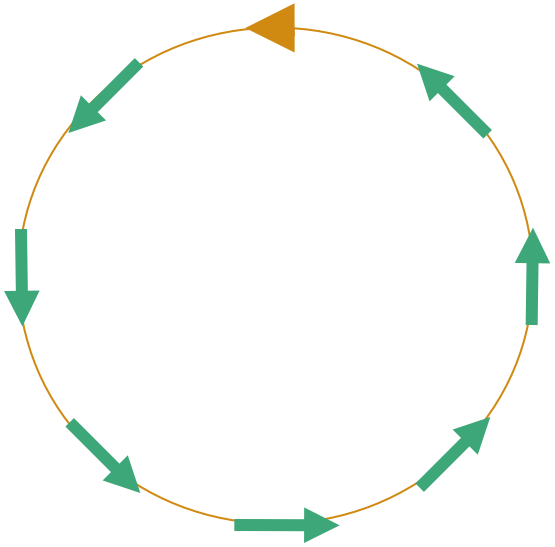

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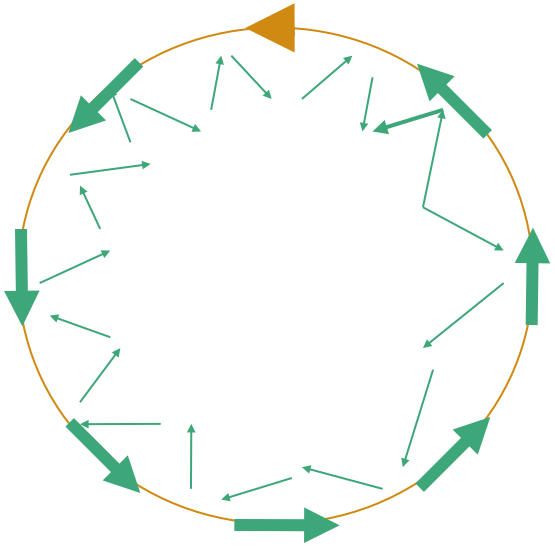
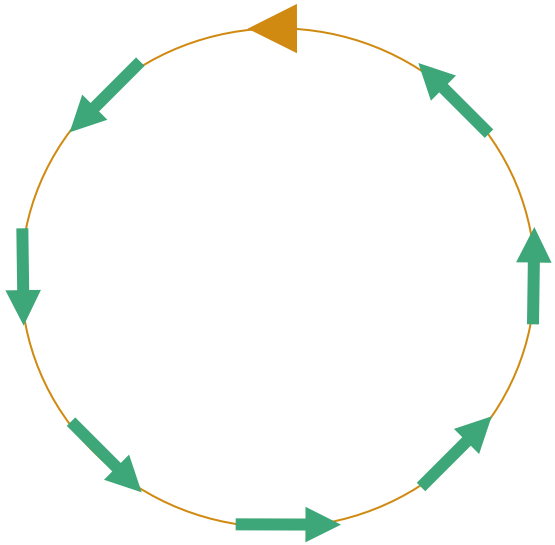


life = self-maintenance

a double negation



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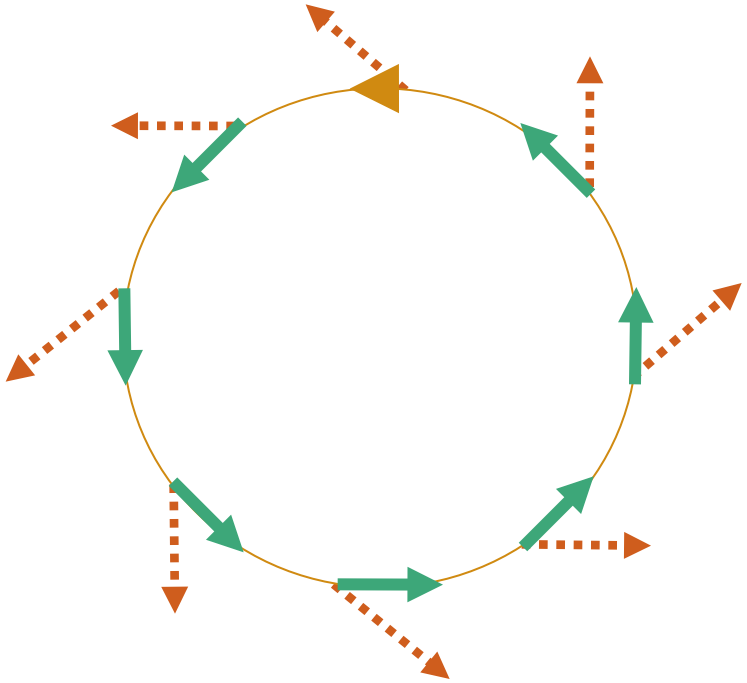

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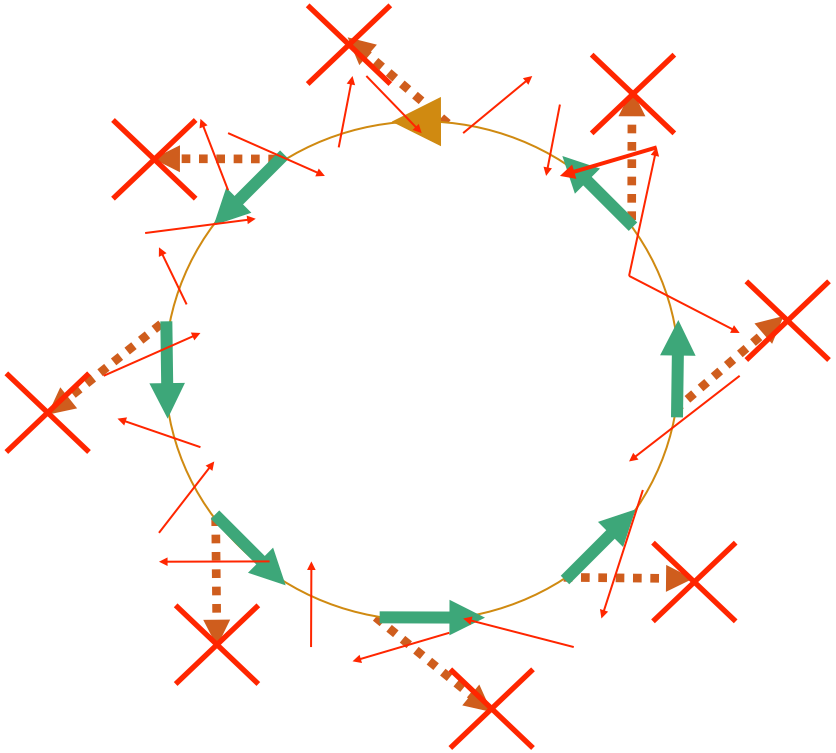

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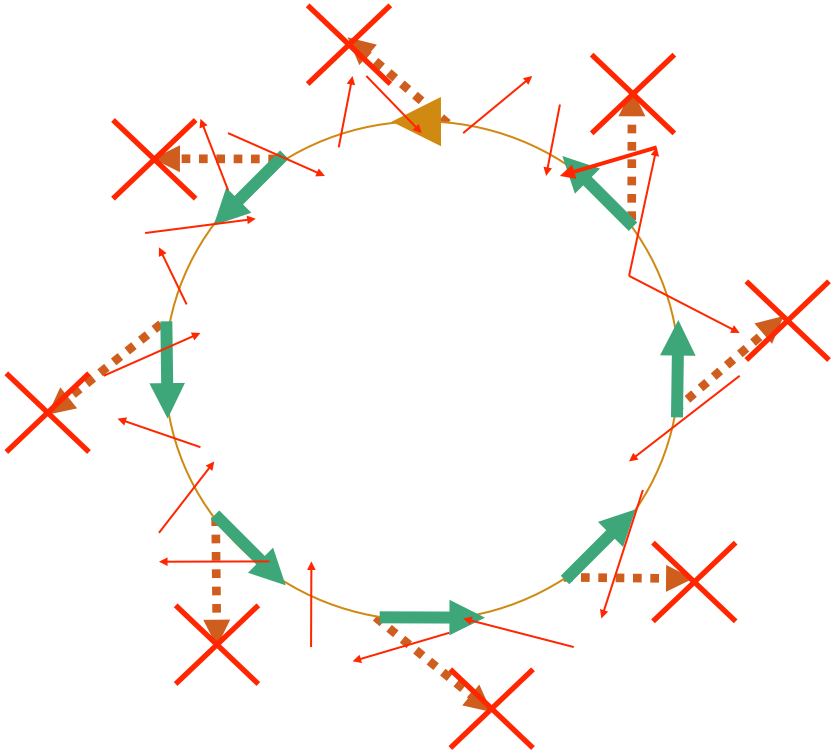


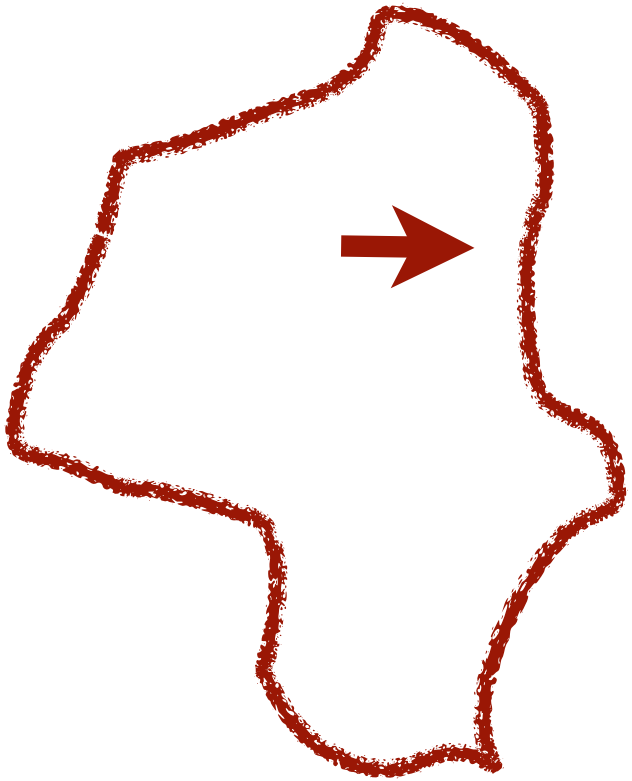
life = “frustrated suicide”

sense-making

- A self-sustained identity implies a normativity with respect to interactions with the world.

- If the mechanisms are present that allow regulation guided by this normativity, the system is now capable of sense-making, the active engagement with the world in terms of meaning and value (i.e., in terms of consequences for a precarious identity).

- Adaptive monitoring and regulation of the states of the system avoiding as a result trajectories that cross the boundary of viability.



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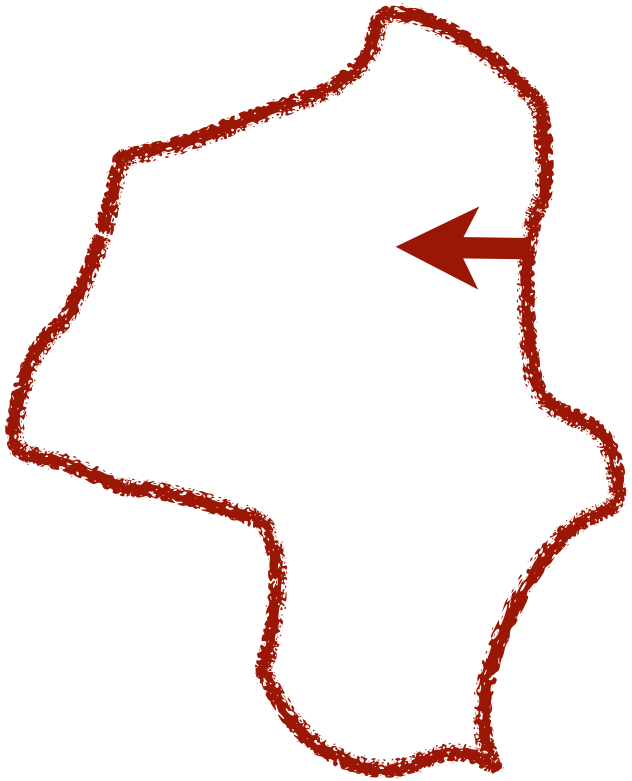

agency

- Three requirements to capture the common use of the term:
- Individuality.
- Asymmetry
- Normativity
- Agency: sense-making of a precarious autonomous identity in the interactive domain - when the system adaptively regulates its coupling with its world.
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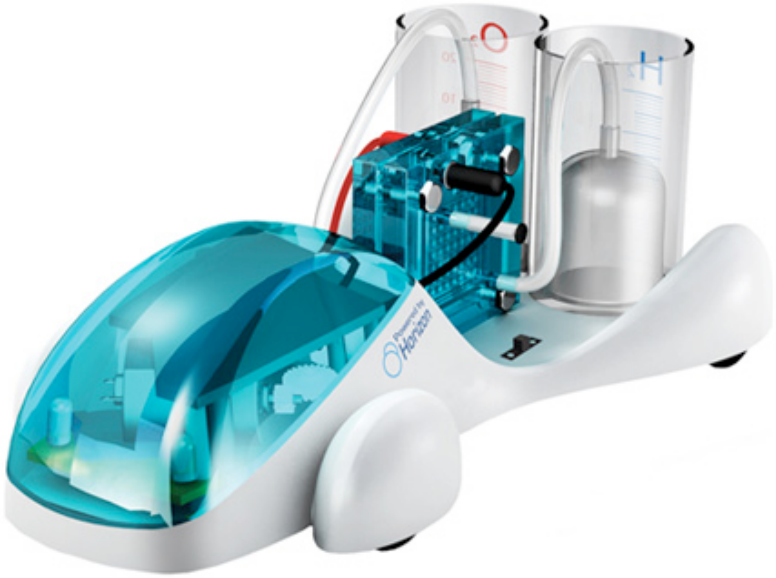

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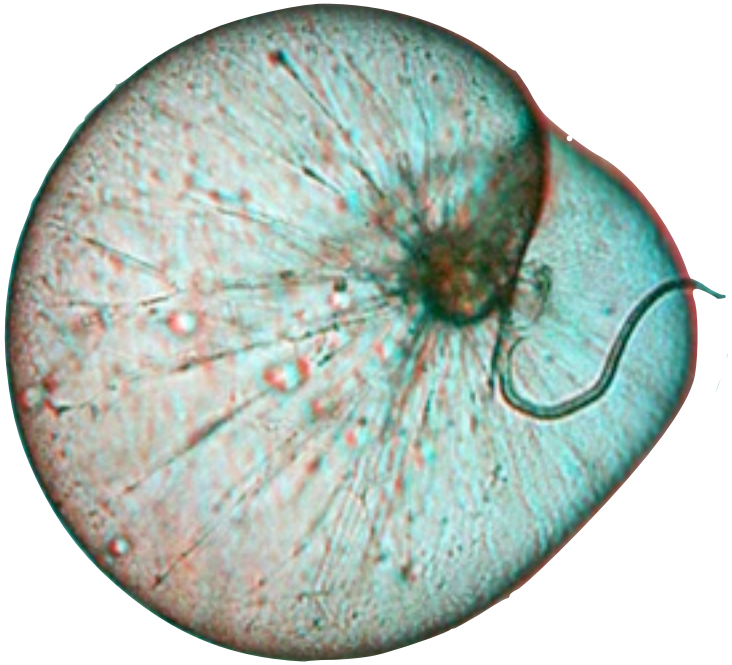

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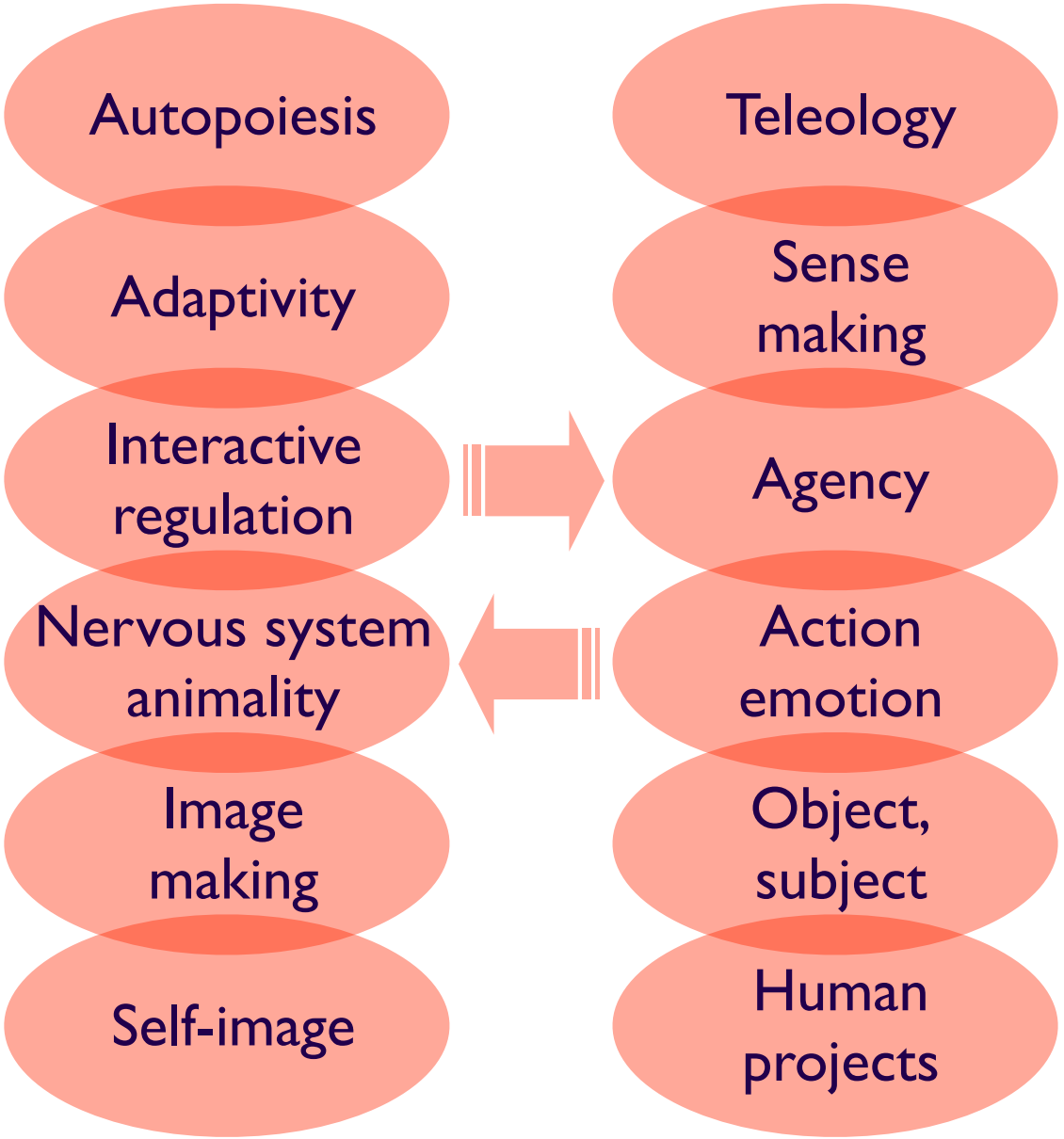
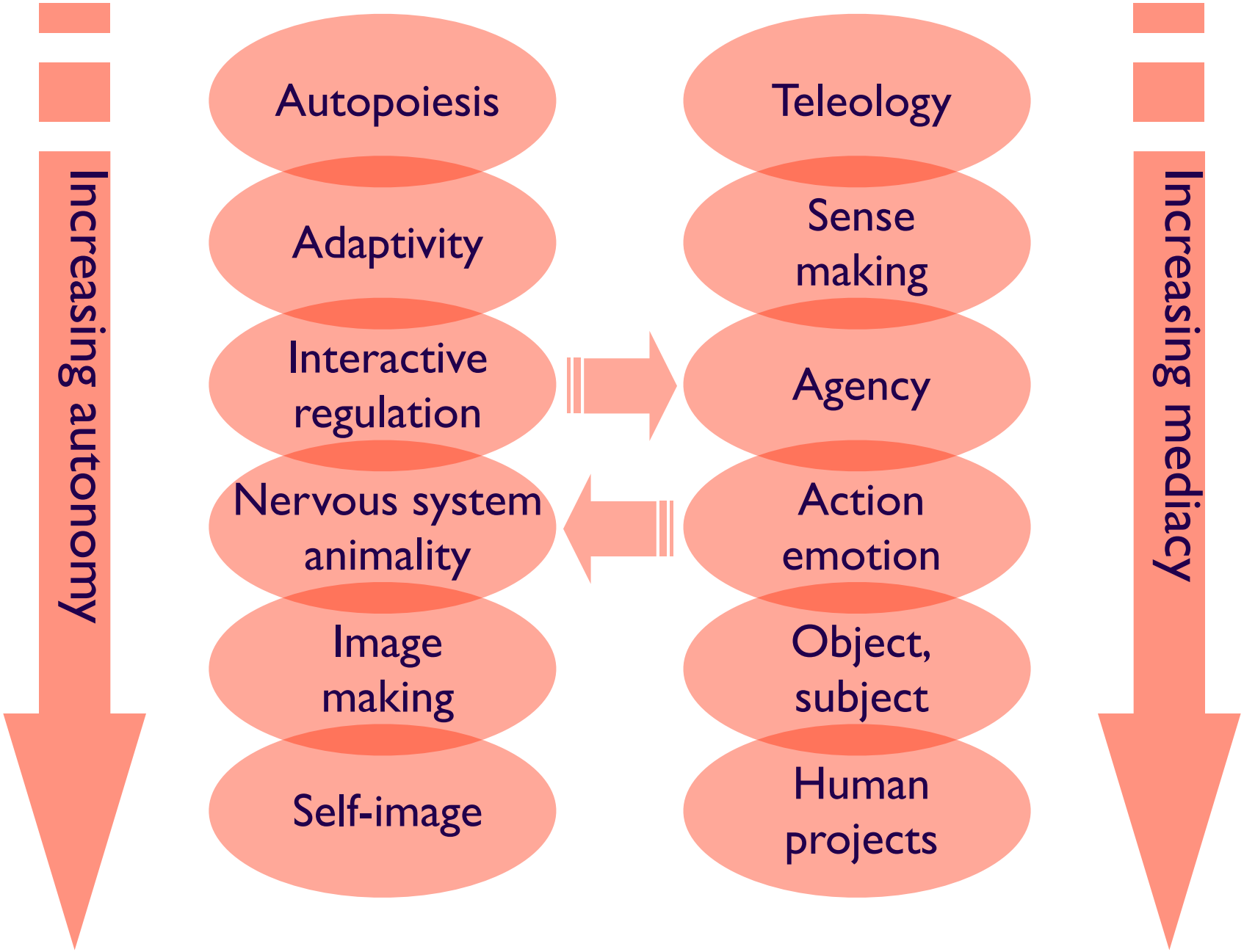

Autopoiesis
Adaptivity
Interactive regulation
Nervous system animality
Image making
Self-image
Teleology
Sense making
Agency
Action emotion
Object, subject
Human projects


Increasing autonomy
Autopoiesis
Adaptivity
Interactive regulation
Nervous system animality
Image making
Self-image
Teleology
Sense making
Agency
Action emotion
Object, subject
Human projects
Increasing mediacy

animality

- Self-movement: spatial know-how.
- Proprioception essential to build a knowledge of space
- Intentional distance (tension/satisfaction) is regulated by temporal distance (how much is the tension sustained, how fast is satisfaction attained) and in animals they both acquire a spatial logic, a properly spatial distance so that now and there correlate to later and here.
- Emotion comes into being with action and perception. It's the unfolding of basic sense-making into a spatio-temporal bodily matrix.
- Territoriality.
- An animal has a lived body.

irrevocable transitions

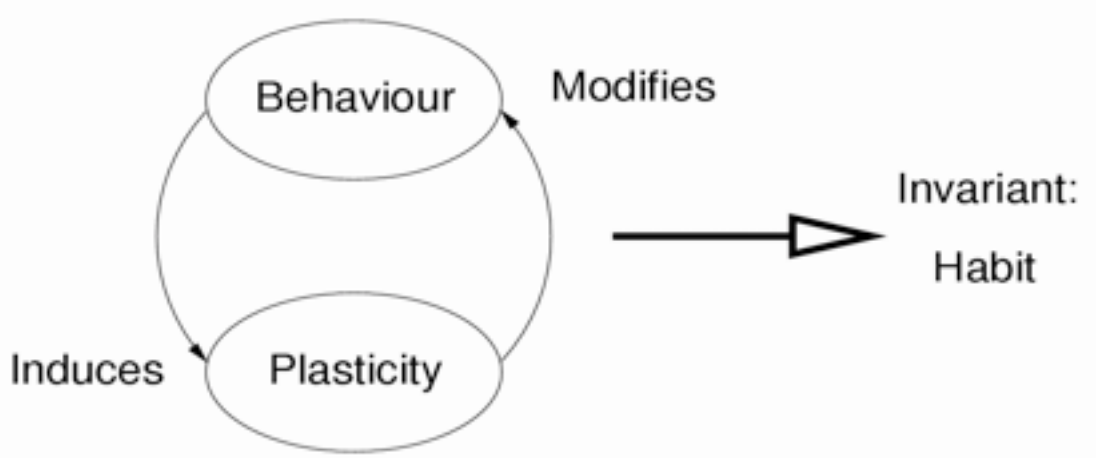
- Needful Freedom: The development of the dimension of concern from metabolism to human projects is marked by transitions where the freedom gained by the primordial processes of life is occupied with novel ways of generating value.

- From the point of view of metabolism, these transitions are of doubtful gain.

- But for Jonas, these transitions cannot go back. Therefore, they must be enabled by *new forms of life*.

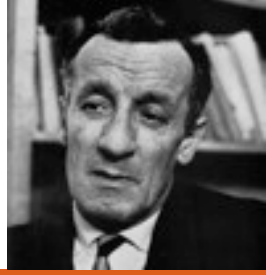
beyond the organism: habits

Hegel, K. Ravaisson, de Biran, Goldstein, J. Dewey, W. James, M. Merleau-Ponty, P. Guillaume, N. Berstein, I. Kohler and others have used the term 'habit' to describe how the body, as an ecological entity, sets itself into stable patterns of action and perception.



Walking
constrains
forms
Path

non-metabolic values



- Animal action has an organization of its own, underdetermined by metabolism. It is enough to posit a similar kind of self-sustaining dynamic form in neural and bodily activity to see how value can also be generated at this level.

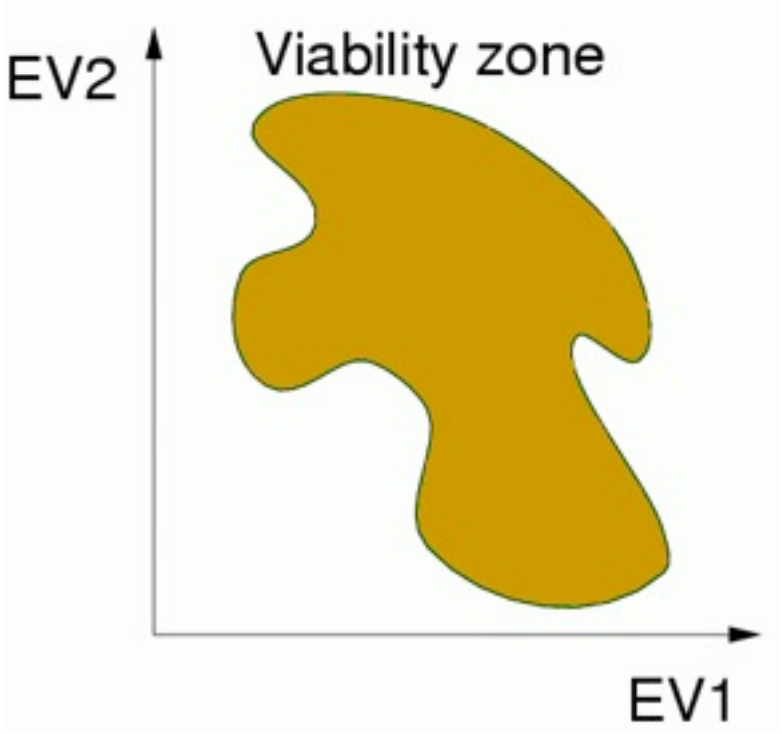
- Merleau-Ponty's concept of motor intentionality is the most direct account of this self-affirming property of the body in activity.

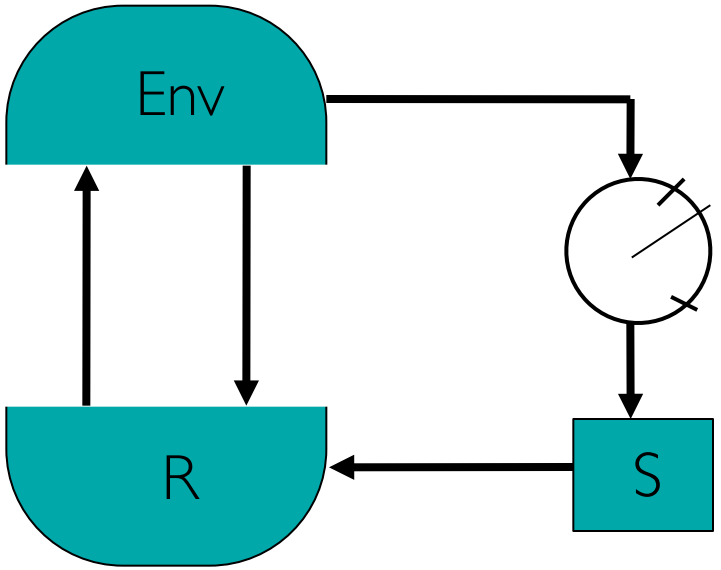
- Acts form organized wholes, their form imbues events with meaning, but this meaning "talks" directly to the act, and only indirectly to metabolism.

- So, gestures can be elegant, pauses clumsy, etc.

- New modes of value-generation → New (transient) identity

ultrastability





adaptation to visual inversion

A model of adaptation to inversion of the visual field

Homeostatic neurons, local plasticity

Evolve for homeostasis and phototaxis

Di Paolo, 2000

adaptation to visual inversion

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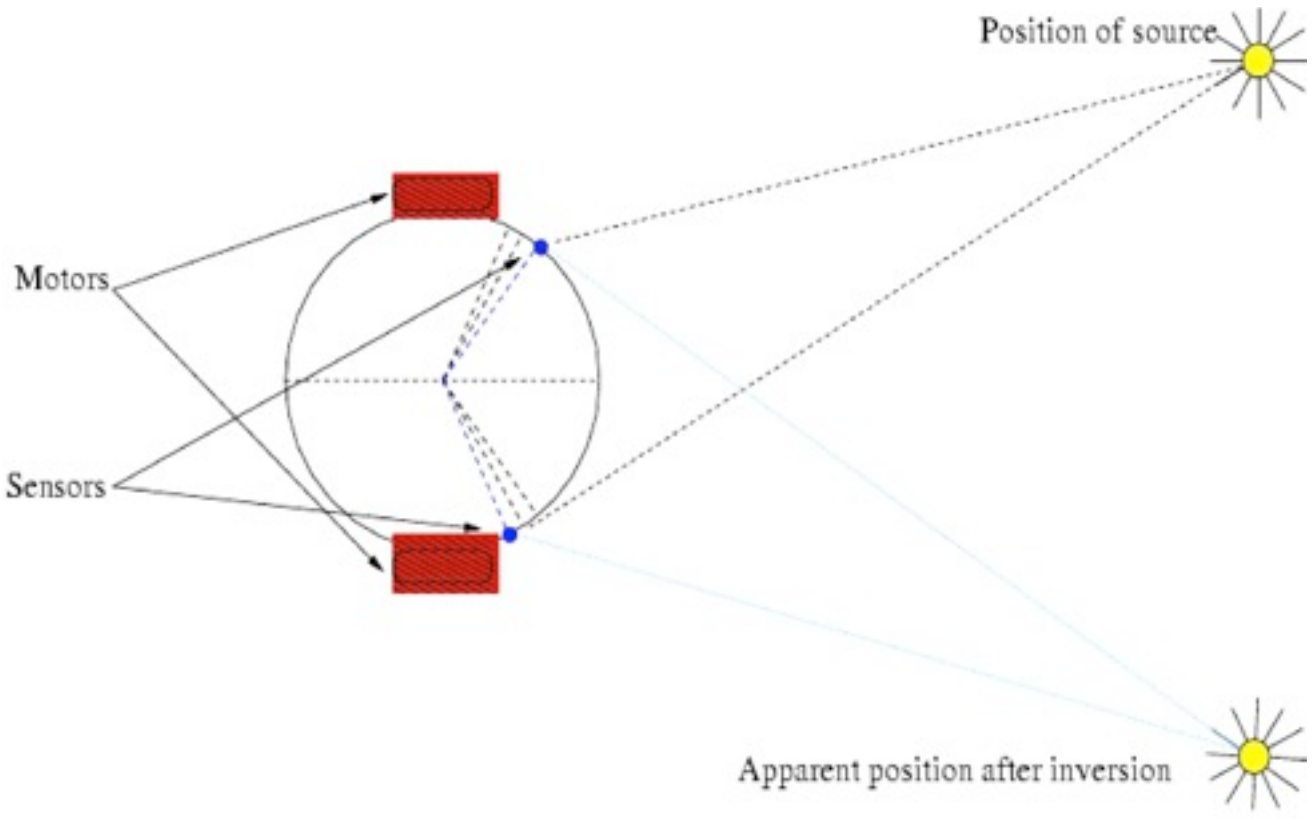

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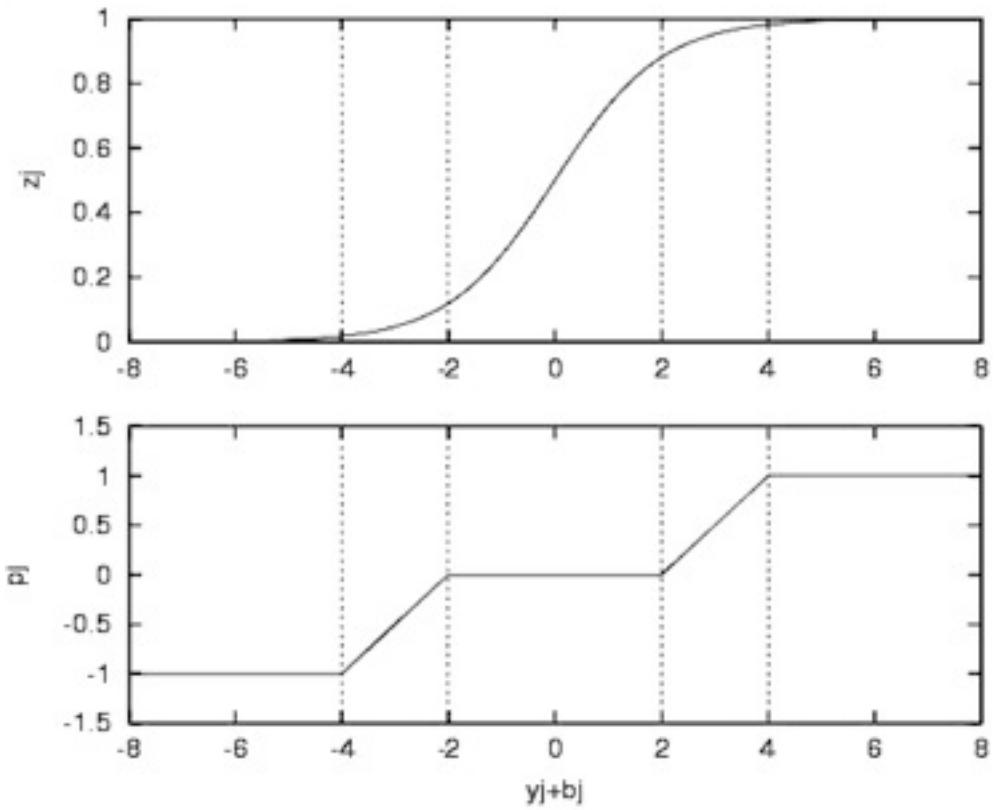

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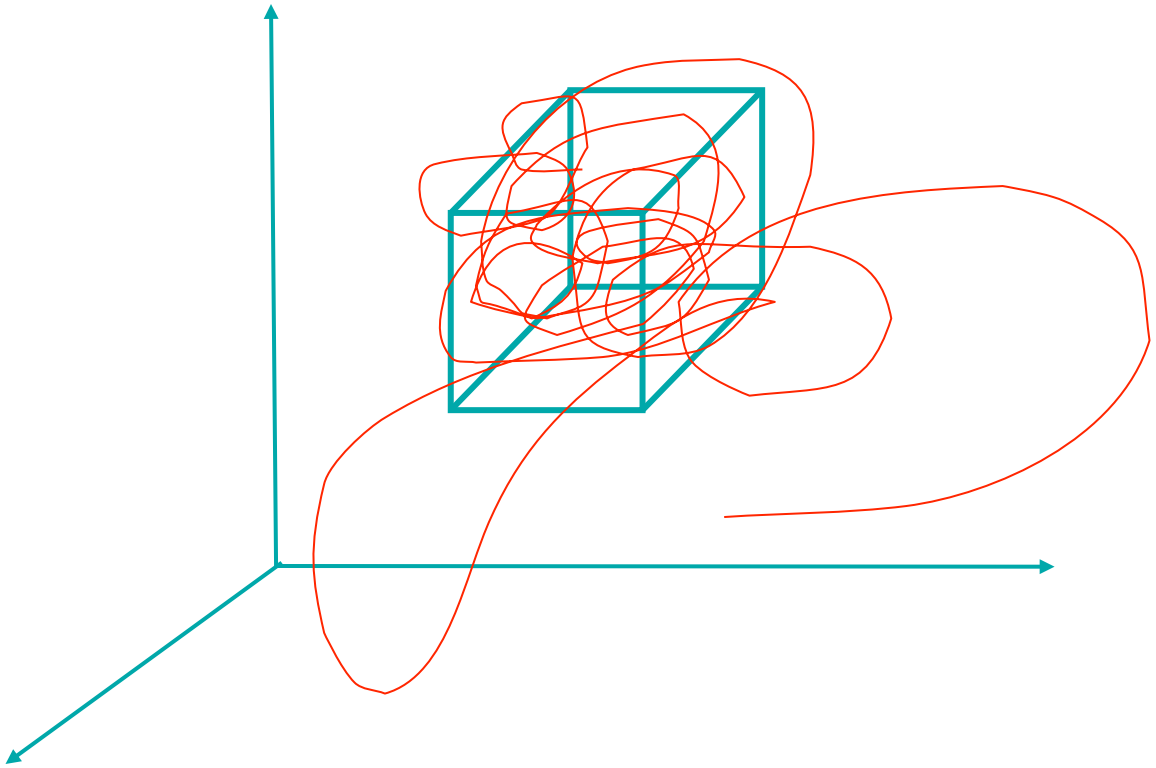

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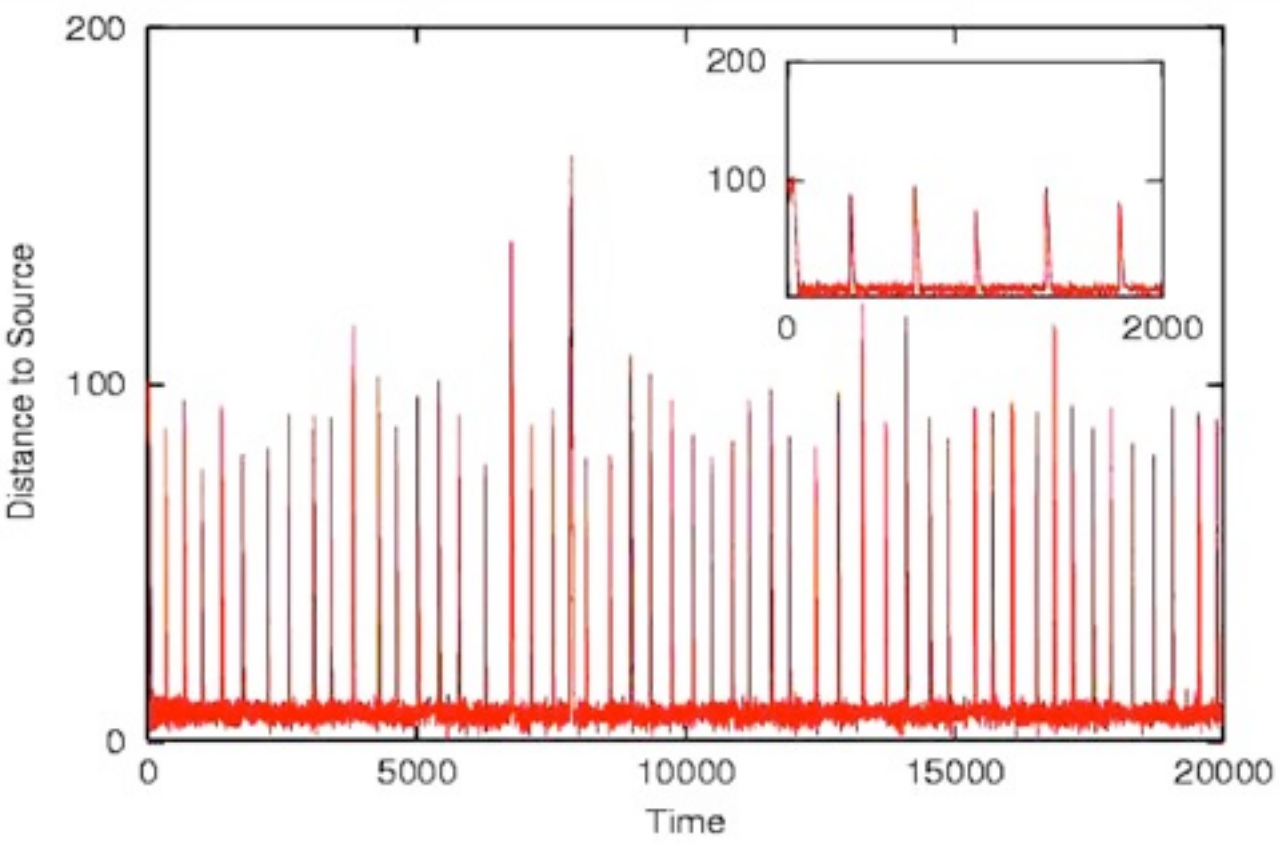

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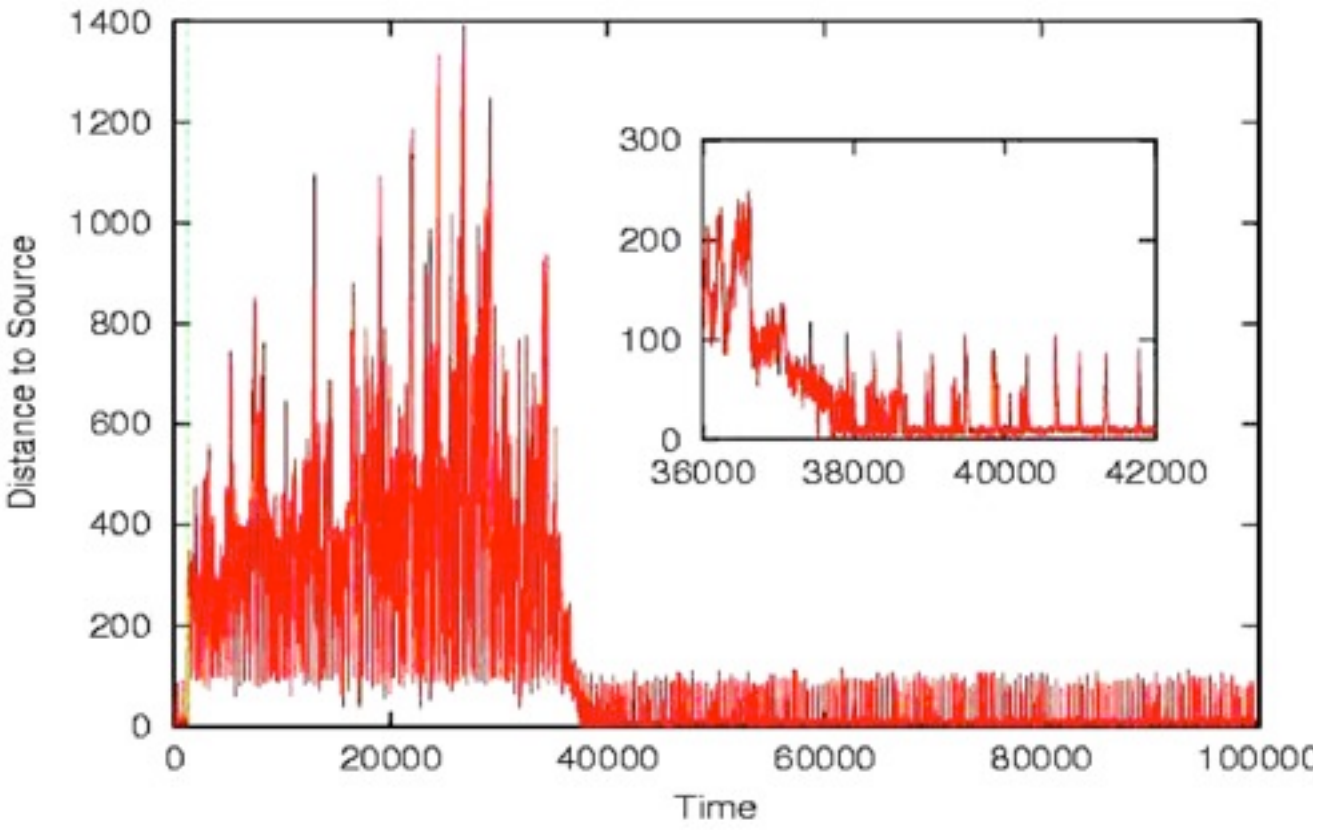

life on a string

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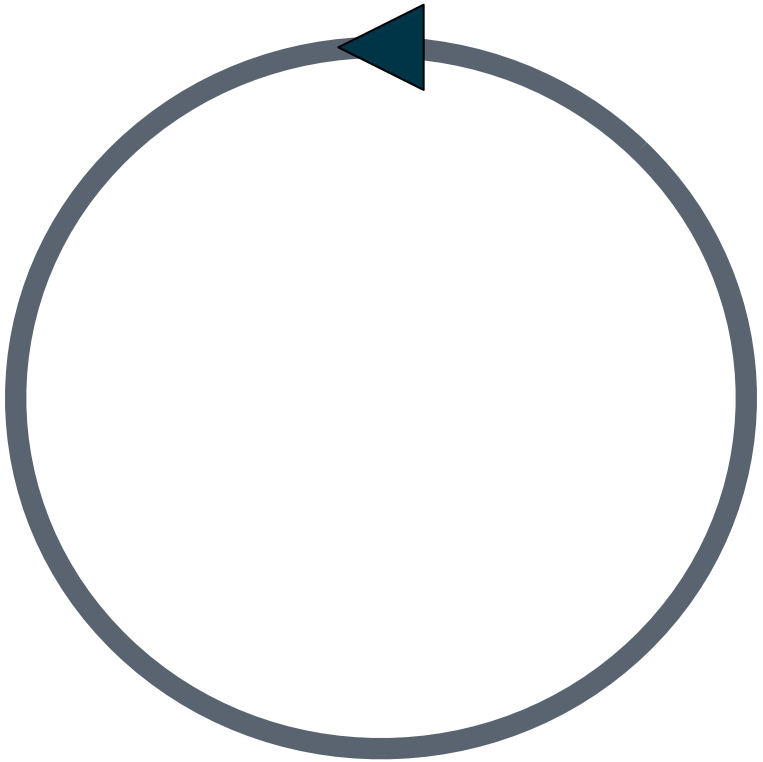


life on a string

life on a string

how mind shapes the body

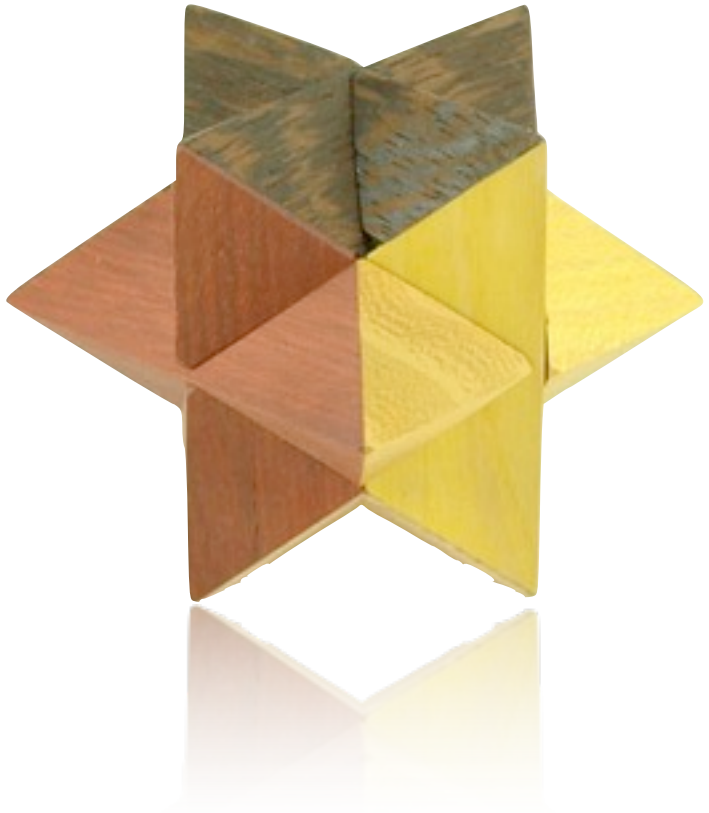
- Crossing the personal/sub-personal domains both ways
- Habits introduce their own normativity.
- As metabolism starts to depend on mind, the normativity of mind can influence metabolism.
- Habits become mutual translations between the *psychic* and the *somatic*.
- Mind is *re-inscribed* in the body.
- Life/mind is a *new form of life*. Inherently restless, where inner conflicts are likely, and where a psychosomatic order is introduced.
- Similar transitions happen in the social realm and in human agency.
- "Our physiology is a social physiology" (Levins & Lewontin).
- Hegel on habit and madness (*Philosophy of Mind, part II of Enc.),* Catherine Malabou.

underwater vision

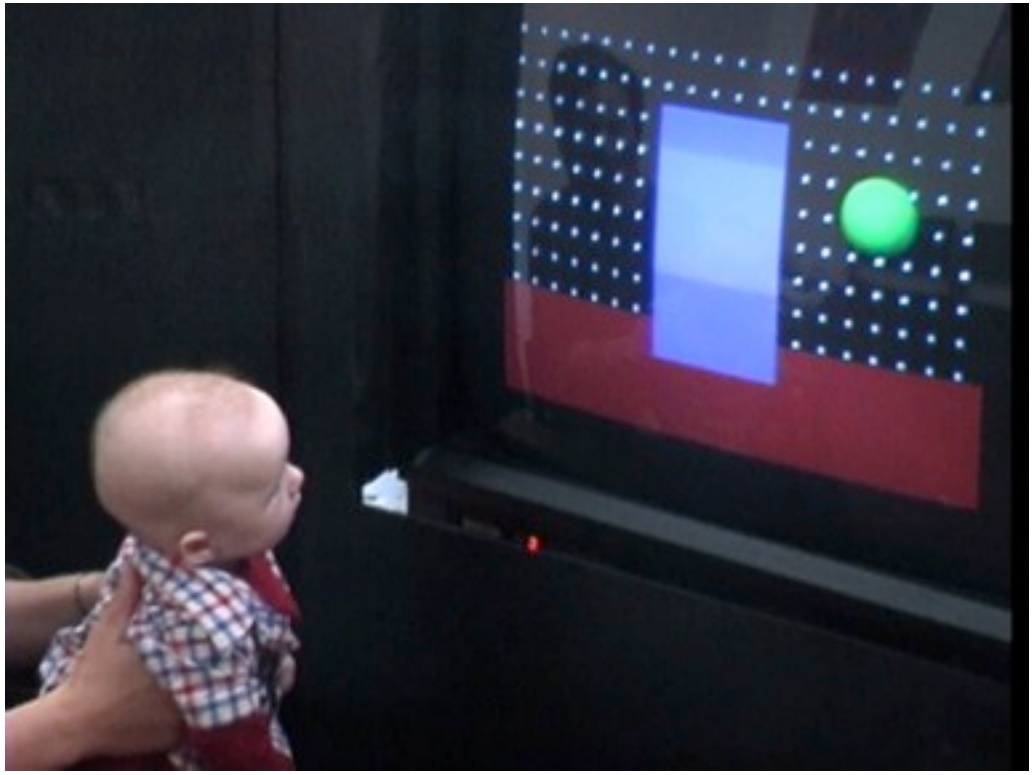
Moken "Sea gypsies" children between 7 and 14 years old in Surin Island have been tested for underwater vision and shown to see twice as well as European children, (Gislén et al. 2003).

human perception: a special case?

- Isn't abstract perception, the departure point of most philosophies of perception, a rather special case?
- Animals do not engage with the objects of their perceptions in this abstract sense. They are captivated by it, it becomes salient only in terms of an underlying motivation (food, shelter, danger).
- What makes human perceivers "stand against" an object (*Gegenstand*)?

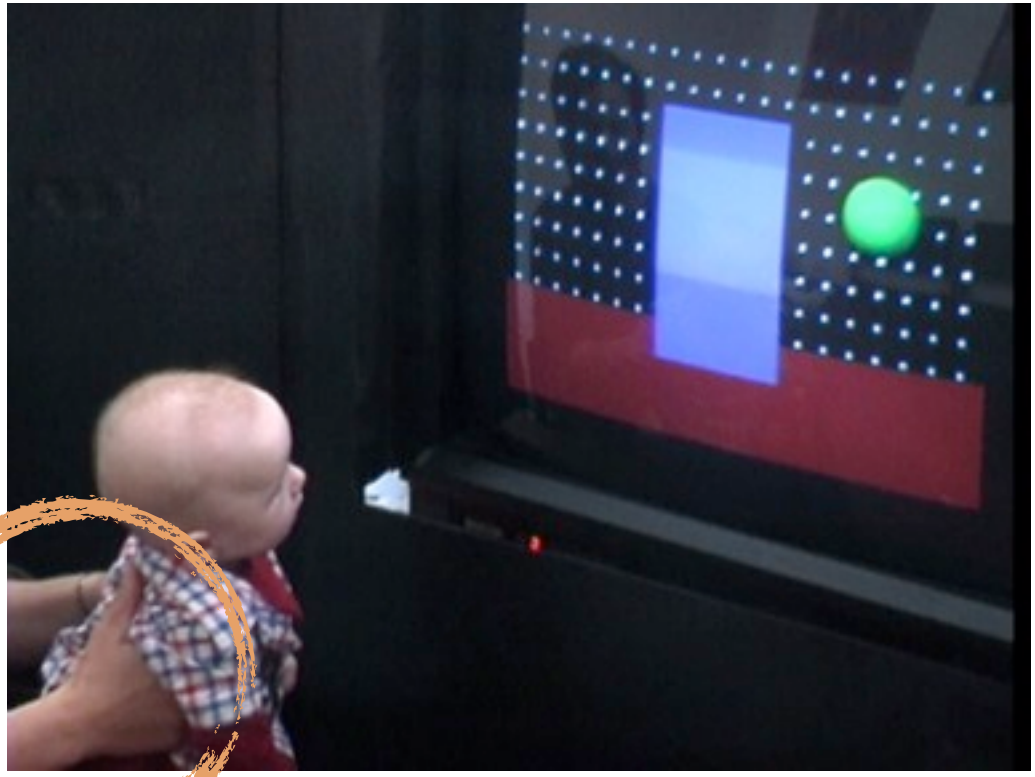


second nature



There's nothing natural about human perception

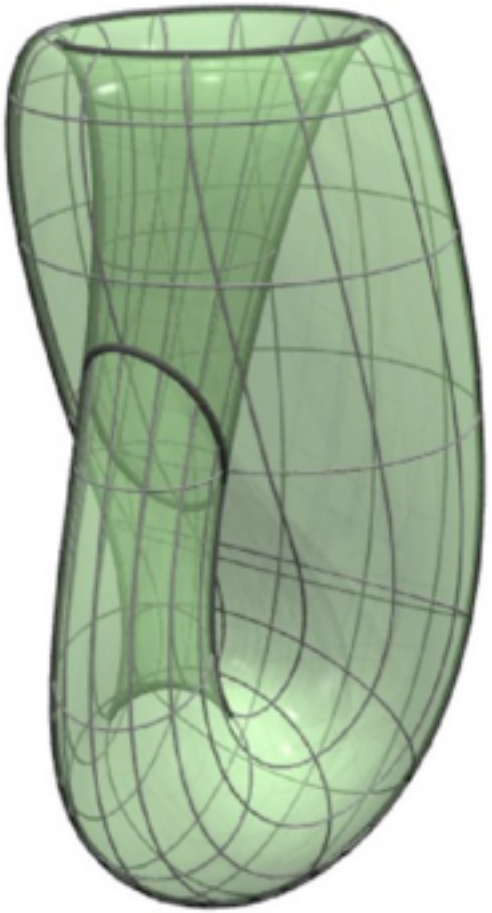
second nature



There's nothing natural about human perception

neither inside, nor outside

- For enactivism, mind is always relational, never inside the head.
- However, dialectical developments of relational processes, reconstitute and redefine the mindful system we start with and transform it into something different.
- Constitutive and relational domains are not just mutually defined, but also mutually *transforming*.



what sort of body?

- 'Shallow' embodiment:
  - Extended mind: Moves beyond computationalism by showing non-trivial dependence on the situated body (out-of-the-head).
  - Significant contributions to novel theorising and modeling.
  - But susceptible of being interpreted in purely functionalist terms.
- Deep embodiment:
  - The body precarious, the most basic source of significance.
  - Enaction: A non-reductive and naturalistic approach to the mind
  - Sceptical of functionalism (representationalism, boxology), neuro-centrism and individualism.
  - Provides operational definitions of autonomy, agency, values, sense-making and social interaction.
  - Links the sub-personal, personal and inter-personal in novel ways.

Barandiaran, X., Rohde, M. and Di Paolo, E. A. (2009) Defining agency: individuality, normativity, asymmetry and spatio-temporality in action. *Adaptive Behavior*, 17: 367-386

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Thank you

http://www.informatics.sussex.ac.uk/users/ezequiel/

http://lifeandmind.wordpress.com/

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Enaction

TOWARD A NEW PARADIGM FOR COGNITIVE SCIENCE

edited by John Stewart, Olivier Gapenne and Ezequiel A. Di Paolo

This book presents the framework for a new, comprehensive approach to cognitive science. The proposed paradigm, enaction, offers an alternative to cognitive science's classical, first-generation Computational Theory of Mind (CTM). Enaction, first articulated by Varela, Thompson, and Rosch in *The Embodied Mind* (MIT Press, 1991), breaks from CTM's formalisms of information processing and symbolic representations to view cognition as grounded in the sensorimotor dynamics of the interactions between a living organism and its environment. A living organism enacts the world it lives in; its embodied action in the world constitutes its perception and thereby grounds its cognition. *Enaction* offers a range of perspectives on this exciting new approach to embodied cognitive science.

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Adam Sheya
Linda B. Smith
John Stewart
Evan Thompson

Some chapters offer manifestos for the enaction paradigm; others address specific areas of research, including artificial intelligence, developmental psychology, neuroscience, language, phenomenology, and culture and cognition. Three themes emerge as testimony to the originality and specificity of enaction as a paradigm: the relation between first-person lived experience and third-person natural science; the ambition to provide an encompassing framework applicable at levels from the cell to society; and the difficulties of reflexivity. Taken together, the chapters offer nothing less than the framework for a far-reaching renewal of cognitive science.

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