

The ontological primacy of cycles

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Introduction I

CAS: old wine in new bottles

- Old interest for adaptation, evolution, progress
- For understanding of how knowledge, i.e., control on the environment, is built and preserved in the organization. No matter it's biological, psychological or sociological nature.
- CAS is just a more fashionable (since new) label for this elusive object that used to be called organization
- We still have no clear definition of it. But don't we need one ?

Introduction II

- Piaget's genetic epistemology: Organization = Cycle (or causal loop)
- Epistemological and ontological significance
- A social twist (return to J.M. Baldwin and imitation)
- Coupled oscillators dynamics

Outline

- Why an organization should be seen as a cycle or a causal loop ?
- Piaget 's *assimilation cycle* and its epistemological consequences
- Ontological consequences
 - organism / environment dichotomy
 - the mimetic construction of the environment
- An operational model : coupled oscillators dynamics
- Conclusion

Some preliminary observations

- Definitions of life are rare (and yet, non-consensual)

“One might think that among the many people working in fields of prebiotic life, artificial life, cell models and the like, one finds many references to a definition of life in the literature. These researchers should know what they are researching or what they are trying to reproduce in their laboratories. This is not the case: actually definitions of life are rare.”

(Luisi 1998:613)

- Definitions of social organization are rare
(loose and still not consensual)

"Organization is a complex and multifaceted phenomenon. It is therefore virtually impossible to provide a satisfactory all-encompassing definition. Listing its characteristics is usually felt to be sufficient. In this vein, organizations are often described as associations:

- * of individuals, whose aim is to achieve *goals*;
- * in which the work is split up into different tasks (specialization and *differentiation*)
- * in which the *integration* of activities takes place by means of formalized rules and a hierarchical structure (management structure);
- * with a certain *permanence* in time."

(Veen & Korver 1998:5)

"Many different definitions of the term "organization" has been suggested, and each of these definitions reflect the pragmatic experience and the theoretical viewpoint of its author."

(Dolan et al. 1996:12) (*translation is mine*)

- Definitions of ‘ organization ‘ *per se* are even more rare

- But they are necessary:

"In dealing with organization theories it is necessary continually to ask what an organization actually is, and what aspects the theories are trying to explain in consequence."

(Veen & Korver 1998:5)

"We think it useful to attempt an implementation independent mathematical theory of abstract functional organizations which is based on necessary and sufficient assumptions."

(Fontana & Buss 1996:51)

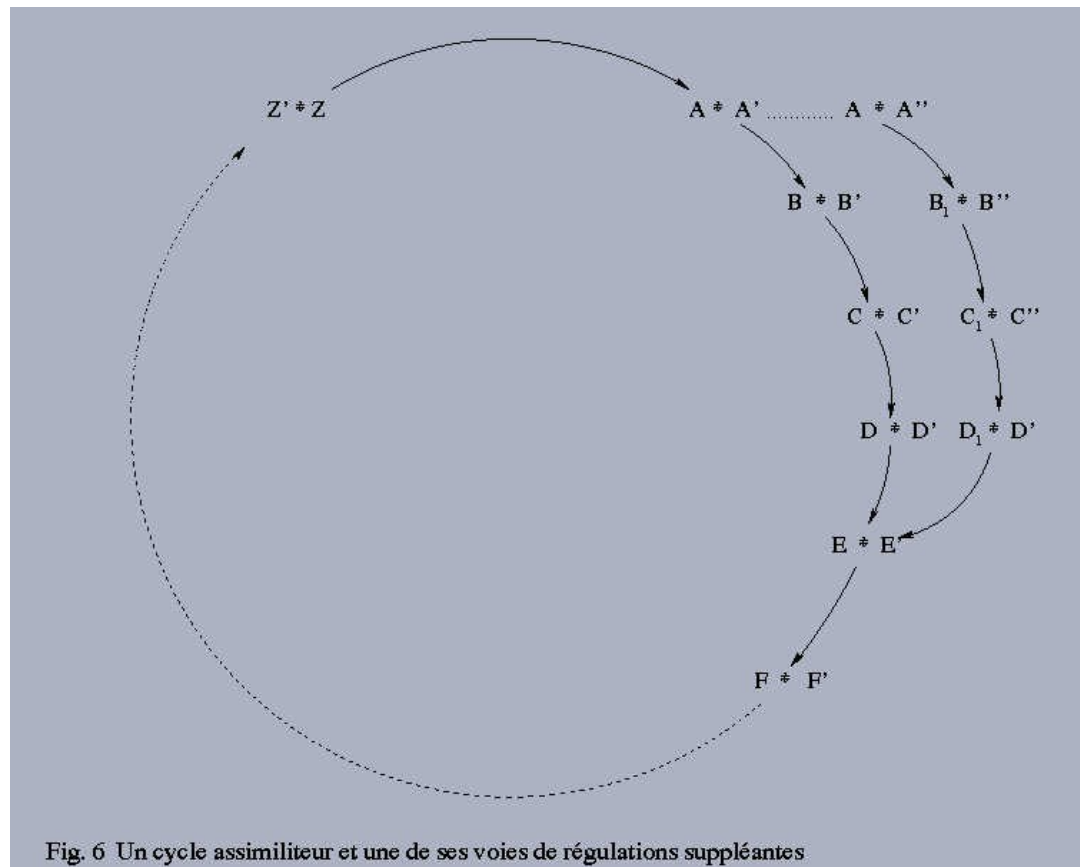
Why is it so ?

- Intrinsic difficulty ?
- Polarization ? (biological *vs* social)
- Lack of interest ? (progress oriented)
- Strong misleading ontological premises ?
(Heraklites 'insight is still not common knowledge)

Looking for invariance :

- Induction: the cyclical nature of organizations
 - circular reaction, functional circle, assimilation cycle, autopoiesis, hypercycles, closure under efficient cause
- Deduction: the need for stability
- Abduction: the ontological (and epistemological) significance of organizations as cycles

Piaget's assimilation cycle, I



Piaget's assimilation cycle, II

- Abstract, physico-chemical, recursive representation of organization
- Congenial to both Eigen's hypercycles and Fontana's algorithmic chemistry:

"cycle of physico-chemical and kinetic processes which, in continual relation with the *milieu*, generate each others." (Piaget 1936:11)
(*translation is mine*)

- Basically, this is a didactical tool intended as an illustration of the dynamics of :
 - organization / adaptation
 - stability / plasticity
 - assimilation / accommodation

Piaget's assimilation cycle, III

- *Assimilation* (digestive, cognitive) is extremely important !
- The stimulus is “perceived” as much as “produced”
- It's a circular reaction in Baldwin's sense (a habit)
- This organization builds the regularity or the *invariance* of its stimulation
- Homeostasis is a general phenomenon: it's a necessary aspect of organization
- The stimulation is not a mere environmental property, it is a property of the organisation. Perception is activity bound
- Brooks' insight : adapted behavior requires an integrated sensorimotor unit:
 - “ This alternative is to operate in a tight coupling with the world through a sensing-acting feed-back loop. Instead of relying on inaccurate values returned by noisy sensors, we can rely on the time averaged derivative of these signals as the creature actively changes its state within the world in a way which forces larger changes in the sensor readings than those contributed by noise. ” (p 437)
- Organizational hermeneutics (affordance, genes)

The organism / environment dichotomy

- In the organization, environment and organism are not separated
- An organization is a stable dynamics of its “milieu”
- Like a whirlpool in bathwater, it is not possible to draw the line between them
- Problems with dichotomist representations
- So, what “exist” in the first place is the organization cycle:
Entity = Organization = Causal Loop
- The epistemological cycle:
deconstruction \leftrightarrow reconstruction

The mimetic construction of the environment

- Termites building behavior: the stigmergy theory
- Workers supposedly indifferent to the behaviors of others
- But imitation is everywhere !
- The nest is not a first cause
- The nest *is* the environment, but yet, is part of the organization of the colony

The dynamics of coupled oscillators

- Frequency and phase locking
- Coordination
- Imitation

Conclusion

- Is theory of organization a theory of everything ?
 - “ The case with which biological interpretations are possible in our abstract approach raises the possibility that we are confronted with a universality class, i.e. the possibility of a theory of organization that is independent of the details by which actual systems implement, generate and evolve organizations ” (Fontana & Buss 1996:58)
- Relevance of Piaget’s theory : “from physics to politics”