EPOS II
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Reconstruction Failure: Questioning Level Design

"What causes the failure of a simulation-based reconstruction?"

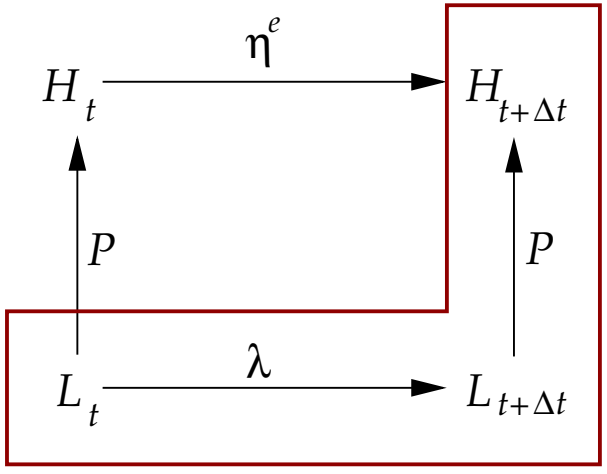
Camille Roth

Department of Social & Cognitive Science (Univ. Modena & Reggio Emilia)
and
CREA (Center of Research in Applied Epistemology, CNRS/Ecole Polytechnique)
e-mail: camille.roth@polytechnique.edu

Reductionist simulation

Dynamic reconstruction

- Empirical dynamics η^e
- $\rightarrow$ Propose a low-level-based dynamics (eg agent-based) λ
- Aim: $P \circ \lambda(L) = \eta^e(H)$
- Analytical or simulation-based



What if commutativity fails?

Emergentist simulation

Anderson (1972) “ *Psychology is not applied biology* ”

What are the options?

1. Emergent phenomenon as an epiphenomenon
2. Emergent phenomenon has causal powers

Bitbol (2005)

> “ *Consider the crucial case of “downward causation”, namely causation from the emergent level to a basic level : from the social to the mental level; from the mental to the biological level; and from the biological to the physical level. Within their predominantly substantialist framework of thought, the emergentists are inclined to require productive causal powers of the emergent properties on the basic properties. And nothing of the sort is in sight. At most, one can find ways of seing some complex mutual interactions of large numbers of basic components as “trans-scale” causation.* ”

Levels as observations

Each level is seen as an observation instrument (a *phenomenon*), and may provide information about some other observation gained through other instruments.

$$\lambda(L|H), \eta(L|H)$$

What's different?

- No substantial reality of levels
- No reciprocal causation, but informational links
- Some phenomena cannot be rebuilt from some given lower-level decriptions
- The reductionist approach makes a bet

Questioning level design

Neural activity to explain learning

Social network models to explain knowledge communities

Extending ontologies

- Rather than the claim that each level exists as such, substantially, it is a claim that observation devices exist as such.
- Techniques to create endogeneously a new level from existing descriptions are great, even if limited to what these descriptions provide.

Conclusion

Mistakes are not to be found necessarily in λ, η nor in putative projection functions; but rather in the definition itself of levels *L* and *H*. In front of unsuccessful models and simulations, reductionist and emergentist attitudes in designing models and appraising simulation failures may make it harder to detect ill-conceived modeling ontology and subsequent epistemological dead-ends: some high-level phenomena cannot be explained and reconstructed without a fundamental *viewpoint change* in not only low-level dynamics but also in the design of low-level objects themselves — e.g. introducing *new* glial cells or *new* semantic items, artifacts.