

Two New Principles of Interactivist Architecture:

Microgenesis and Themes.

Mark H. Bickhard

Mark H. Bickhard
Institute for Interactivist Studies
17 Memorial Drive East
Lehigh University
Bethlehem, PA 18015
mark@bickhard.name
<http://www.bickhard.ws/>

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Standard computationalist models construe process as programs operating on encoded symbols, or as representational activation vectors coursing through state space. There is more wrong with such models than just their encodingist notions of representation; there is also a fundamental restriction of kinds of dynamics to those that either operate on, or are engaged in by, representations. The interactivist model opens up the possibilities of relevant dynamics in multiple and multifarious ways.

One crucially important example is that of microgenesis. Microgenesis has to do with the ongoing micro-construction of modes of interactive functioning. Ironically, there is something akin to microgenesis in computers, but, for all the damage done by crude importations of computer metaphors into models of cognition, this aspect of computer functioning is relegated to a mere implementational level, and it is never considered that there may be comparable processes in cognition. In fact, microgenesis is a dynamic architectural principle that is essential to modeling heuristic learning and problem solving; analogy, metaphor, and similarity; and multiple other cognitive phenomena.

Another example is that of themes. Themes are functional relationships among dynamic processes that specify aspects or properties of interactions and representations, rather than actions or subactions, or representations or subrepresentations, per se. Themes are essential to modeling higher cognition, and yet can be found in the architectural and dynamic principles of cockroaches. As usual, there is no natural place for themes in standard models.

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Mental process is not executions of programs or manipulations of representations.

Little alternative possible, however, for standard models in cognitive science and artificial intelligence.

Interactivism models the emergence of representation out of more fundamental chemical and thermodynamic processes, thus opening up the consideration of multiple and multifarious other kinds of processes of relevance to mentality.

I will consider two: microgenesis and themes.

Microgenesis

An ongoing micro-constructivism

Differentiation between two processes:

Processes of interaction with the environment

Processes of internal set up and change of state

Example: Computer CPU “interacts” with memory, peripherals, other machines, etc.

The CPU changes what the registers will do with inputs

Different microgenetic set up yields different process in the registers, even with identical inputs

Brain regions similarly can engage in different kinds of process

This requires some kind of micro-construction of the appropriate internal conditions for those kinds of process

This is Micro-genesis

Changes in how the system will interact requires changes in the microgenesis of the appropriate internal interactive processing conditions

Conversely, any changes in the microgenesis processes **will** change how the interactive processes will proceed

That is, learning **is** a process of change in microgenesis

If error produces instability of microgenesis, and success produces stabilization, this constitutes a minimal variation and selection learning process

Heuristic learning is more complex, but also crucially involves microgenesis

Themes

Modes and manners of interaction: frenetic, slow, jerky.

These are not actions.

A need for a model of blending, not just composition, as for bricks.

E.g., meanings in a sentence can blend rather than aggregate.

Properties of actions can blend — e.g., fast and rhythmic.

Cockroaches walking:

Frequency and forward-backward.

Neither are actions, but jointly sufficient to specify action.

Optimal design:

Interaction — everything in line.

Learning — subroutines, servomechanisms, etc. as units of construction.

Avoid having to reinvent the wheel everytime needed.

Learning to learn — aspects and properties of processes, interactions, and interactive subsystems.

Avoid reinventing roundness.

Horizontal inheritance among constructions.

Heuristic strategies as themes.

Outcome space of interactive differentiation: discrete, continuous, or some other structure?

Continuous space of possible differentiations constitutes parameters.

Parameterization is a form of themes.

Continuous space forces thematic parameterization,

But any differentiation outcome can be functional as a thematic “parameter” if it influences further processing in a thematic way rather than in setting up indications of full interactive subsystems.

Mental Dynamics

Microgenesis is ongoing concurrently across the cortex.

Representation, and interactional and representational themes, are emergently generated as a froth or foam from this dynamics.

Some of them may be selected by problem solving heuristics for expansion into macrolevel dynamics.

Such an internal emergent variation and selection process is at the heart of rationality, problem solving, and so on.

It is not modelable in any natural way in any standard framework.