

“EMBODIYING COGNITION:

ARE THERE GROUNDS FOR
CONSENSUS?”

or...

You really thought there was gonna be
consensus???

Come on!

Do unicorns exist?

Toni Gomila

Paco Calvo

“Post-cognitivism”:

ecological perception

situated action

embodied cognition

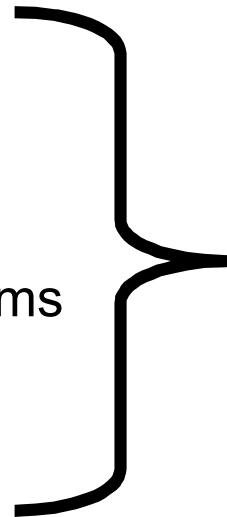
distributed cognition

perceptual symbol systems

connectionism

interactivism

dynamicism



Embodied Cognitive Science

Drop cognition = centralized, information-processing mechanism.

Cognition = emergent and extended self-organizing phenomenon (need to grasp neural/body/environmental interactions in real time).

SO, IT LOOKS PRETTY CLEAR WE'RE ON THE SAME BOAT...

OR NOT?

ARE THERE GROUNDS FOR CONSENSUS?

Quick answer: Yeah, sure! You know...

“emergent”

“self-organizing”

“de-centralized”

denial of ungrounded representations

and of classical computationalism,

embodiment +

context dependency

emotions

ARE THERE GROUNDS FOR CONSENSUS?

different time-scales and different processes
(developmental, microgenetic, learning,
...),

systemic perspective,

compatibility of embodiment constraints and
functional explanation

But does “post-cognitivism” truly converge into a unified, alternative, cognitive paradigm?

Weeell! Let’s give it some thought...

The enemies are not in front,
those are my adversaries,
they are at the back

No way, could be much
worse! F&P'88!!!

But the **roadmap** cannot be
written down by
Cognitivism *alone!*

Otherwise, we end up
saying things like:



You see, the rule was in the weights

-Yeah, but you can only become then competent by injecting the rule into the input layer...

-Yeah, but you're doomed not to get out of your training space.

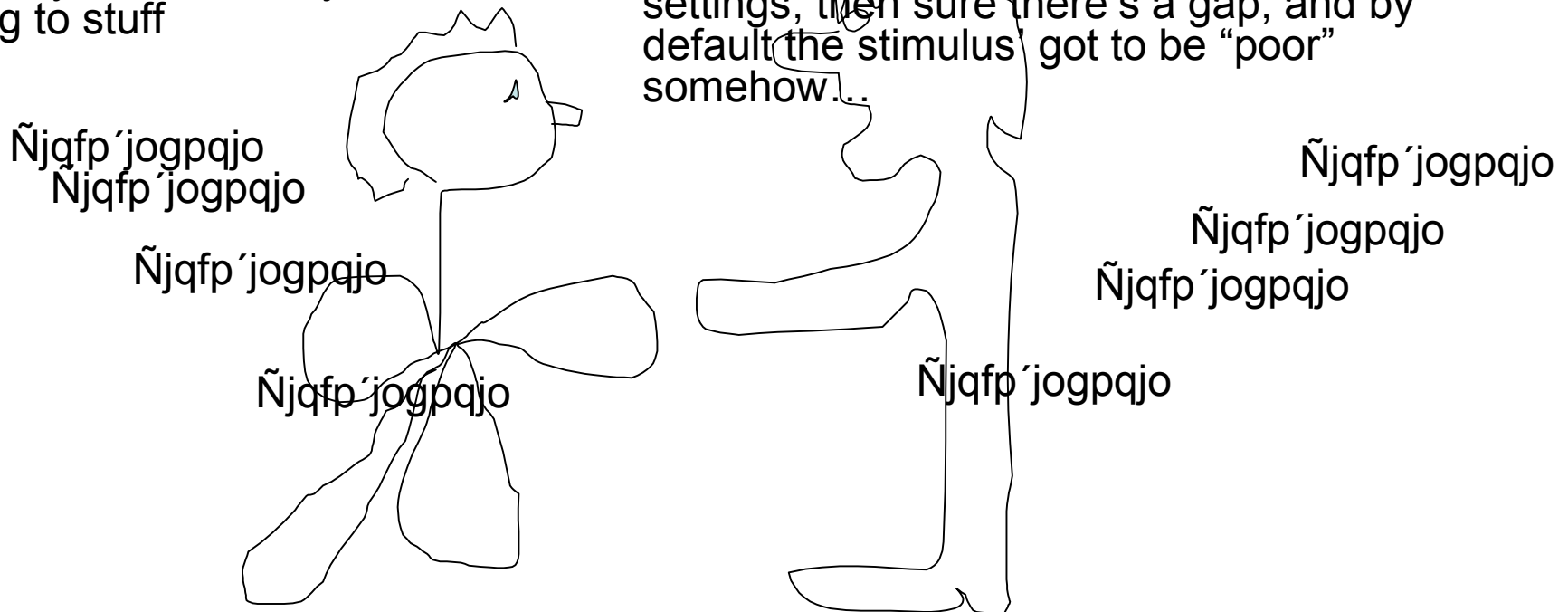
-That you're not gonna be able to account for systematicities in behaviour that cut across your nice way of statistically fine-tuning to stuff

-How d'you mean? The weights are simply adjusted as a reflection of the (statistical) regularities of the environment.

-Give me a break, will you? I need to feed the net with something! And it's just tuning to whatever happens to be out there, and it's got to be damn (sub)-regular. Otherwise, no learning at all...

-Sure, so what?

-Well, if becoming competent means dealing adaptively in previously unencountered settings, then sure there's a gap, and by default the stimulus got to be "poor" somehow...



Brooks and Gibson ACTUALLY EXEMPLIFY orthodoxy!

“[sensory] information is converted to symbols which are then processed and evaluated in order to determine the appropriate motor symbols that lead to behavior”.

Gibsonian affordances “far from removing the need for internal representations, are carefully and simply encoded internal representations of complex configurations of external objects, the encodings capturing the functional significance of the objects”.

Vera & Simon

But is there a sense in which Vera&Simon
MIGHT ACTUALLY BE RIGHT:

(I)dynamicism \neq “3rd contender”

(II)Dynamics = “framework”/“language”? (\neq
SPECIFIC theory)

TABLE 6.2 A Taxonomy of Developmental Theories

From Thelen&Bates' special issue

Theory	Chomsky	Gibson	Vygotsky	Piaget	Thelen/Smith	Elman/Bates
Emphasized mechanism of change	Maturation	Perceptual learning	Internalization	Construction	Self-organization	Emergence/learned connections
Experience	No	Yes	Yes	Yes	Yes	Yes
External information	No	Yes	Yes	Yes	Yes	Yes
Social	No	No	Yes	No	No	No
Biological constraints	Yes	Yes	No	Yes	Yes	Yes
Brain development	No	No	No	No	Yes	Yes
Embodiment	No	Yes	No	Yes	Yes	No
Mental representations	Yes	No	Yes	Yes	No (not in traditional sense)	Yes
Dynamical systems	No	No (yes)	No	No	Yes	Yes
Formal models/simulations	Yes	No	No	No	Yes	Yes

Shifts between attractor states *in response to external triggers* pretty much compatible with Chomsky's "triggering and parameter setting"

It seems we CAN'T EVEN exploit dynamicism to get rid of dichotomies (nature-nurture; learning-maturation; symbol-sub-symbol, etc.)

Dynamicism compatible with Chomskian triggers AND PDP U-shapes: Marcus-Elman debate? Rule-following?)...

(Smith) **The strength**: “the potential for viewing many traditionally separate domains as subsumed under the same dynamic processes.

The weakness: “It does little of the real work. It suggests a way of thinking, a strategy for collecting developmental data, and hopefully, some analysis and modeling techniques that have broad generality.”

“Push the limits of the system under novel circumstances.”

CHALLENGES

- Understanding Control (without central executive)
- Psychological / Neurological interpretation of parameters in a dynamical theory
- Higher-level processes dependent upon sensorimotor processes (avoidance of grounding problem, etc., etc.) Online/off-line E.g., Simulation theory, Grush' emulator theory...
- Coupling-decoupling
- FORMAT of representations (forward models, continuous/discrete,)

Prioritary agenda

- Integration of different contributions into a common cognitive architecture: develop a common framework
- The role of the brain in the brain-body-environment system - neuroscience - functional clusters, dynamic fields
- Hibridity? Basic level architecture plus hierarchical levels - single approach
- Coupling/decoupling - flexibility - off-line - voluntary (deep thought)
- Deepen into the nature of dynamical explanation