

DELEUZE AND COGNITIVE SCIENCE
ONE MORE "NEXT STEP"

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INTRODUCTION

In 2005 Mike Wheeler published a very nice book with MIT entitled *Reconstructing the Cognitive World: The Next Step*. Wheeler writes about – and is at the forefront of – a group of researchers calling attention to what we can call 4EA cognition: "embodied, embedded, enactive, extended, affective." The philosophical resource for Wheeler's "next step" is Heidegger. I think it's time we use Deleuze to take another next step.¹ I'm going to use Deleuze's essay on Lucretius as a lead. There, Deleuze writes about naturalism as demystification. For the 4EA schools, the fight is against myths of the subject.

A few definitions. For the standard approaches, brains, like computers, are physical symbol systems, and minds are the "software" run on those computers. The difference is in the respective computer architectures. Computationalism sees cognition as rule-bound manipulation of discrete symbols in a serial or von Neumann architecture, which passes through a CPU (central processing unit). Connectionism, the second standard approach, is another computer metaphor, but it has a different, allegedly more biologically realistic architecture: parallel distributed processing. In connectionism's so-called neural nets, cognition is the change in network properties; that is, the strength and number of connections.

POINTS OF AGREEMENT BETWEEN DELEUZE AND 4EA COGNITION. 4EA thinkers have already fought several myths of the subject: that it is self-identical, representationalist, isolated, and spiritualist.

First, within the brain, they, like connectionism, break with computationalism's serial computer metaphor. They dismiss the central point, the CPU, by employing dynamical systems theory to study neurodynamical processes as integration or resolution of distributed / differential neural systems. Thus, resonating with Deleuze's desire to think identities as emergent from fields of differences, they have fought the myth of the self-identical subject.

Second, having like connectionism dismissed the CPU, they go another step and break with the representationalism that binds connectionism and its computationalist rival: that cognition is the middle slice in what Susan Hurley called the "classical sandwich": sensory input / processing of representations / motor output. So the 4EA schools accord with Deleuze in fighting the myth of the representationalist subject.

Third, these schools draw the consequences of non-representationalism by displacing cognition from the isolated brain and putting it in distributed systems of brain – body – world. So, in accord with Deleuze's notions of haecceity and assemblage, they fight the myth of the isolated or world-transcendent subject.

Fourth, they put the distributed brain-body-world systems firmly in nature, upholding a "mind in life" thesis, whereby cognition is biological. They are thus in accord with Deleuze's anti-humanism, whereby humans do not form a completely separate case, a "kingdom within the kingdom," as Spinoza put it. They thus fight against the myth of the non-natural or spiritual subject.

Altogether, then, the 4EA schools resonate with Deleuze in seeing cognition as immanent to extended / distributed / differential bio-environmental systems in which "real experience" is the non-representational direction of action via the integration / resolution of differential fields. They thus are naturalist in fighting the myths of the self-identical, representationalist, isolated, and spiritualist subject.

FORECAST OF PAPER: Deleuze can help the 4EA thinkers take another next step in three further demystifications, fighting three other and even more tenacious myths of the subject. *First*, the concept of the virtual can help them think the mode of being of distributed / differential systems, continuing and sharpening their fight against myth of the actual, given, subject. *Second*, the political orientation of Deleuze and Guattari can help us fight two myths that still haunt the 4EA schools: (1) that the object of analysis is an abstract subject, "the" subject, that even though embodied, embedded, enactive, extended and affective is still unmarked by political categories such as race and gender; (2) that culture serves as a reservoir of cognitive resources for individual problem solving. A Deleuzian approach helps here by thematizing multiple subjectification practices; in other words, we have to see subjectification practices as intensive individuation processes from a virtual social field. *Third*, the Deleuzian notion of affect can help us fight the myth of the rational-calculating subject.

DYNAMICAL SYSTEMS THEORY AND NEURODYNAMICS

For some time now I've followed the lead of Manuel De Landa and Brian Massumi in thinking Deleuze alongside dynamical systems theory. Dynamical systems theory uses mathematical techniques to produce models of physical systems. In these models a multi-dimensional manifold is constructed, with as many dimensions as variables of the system to be modeled; this manifold

represents the state space of the system, that is, its domain or range of possible behaviors. A single point represents the state of the system at any one time, while a series of such points forms a trajectory representing changes in the system. Patterns of behavior of the system are represented by attractors in the model; what this means is that the topological features of the manifolds (the distribution of singularities, or points where a function changes direction) structure the development of the trajectories in a phase space. Singularities thus mark off the patterns of behavior as well as the thresholds of change of patterns (known as "bifurcators"). Dynamical systems modeling can be used at many different spatial-organizational and temporal-processual scales. What is of particular interest is when the layout of attractors changes as a result of the development of the system. With this last feature, dynamical systems theory enables us to think material systems in terms of their powers of immanent self-organization and creative transformation.

Deleuze offers a three-fold ontological mapping for dynamical systems models, using the terms "actual," "intensive," and "virtual." Beneath the actual (any one state of a system), we find intensive "impersonal individuations" that produce system states (in *Difference and Repetition* Deleuze distinguishes the field of individuation from the process of individuation, that is, intensive morphogenetic processes), and beneath these we find virtual "pre-individual singularities" (the key elements in manifolds that mark system thresholds that structure the intensive morphogenetic processes).

Here is a chart of these relations.

DELEUZE AND DYNAMICAL SYSTEMS THEORY

DELEUZEAN TERMS		MATERIAL SYSTEM	MODEL	MATHEMATICS
Ontological status	Function			
Virtual ("pre-individual")		Domain / capacities	State / phase space	Manifold
Intensive ("impersonal")	Field of individuation	Metastable field	Attractor layout	Distribution of singularities
	Individuation process	Processes	Trajectories	Functions
Actual		Conditions	States	Points
Haecceities / Assemblages		Situations	Degrees of freedom	Dimensions
Habits		Patterns of behavior	Attractors	Limits
Line of flight		Threshold	Bifurcator	Singularities
Body w/o Organs		Transformative conditions	"edge of chaos"	Fractals
Counter-actualization		Transformation of domain / capacities	Change of attractor layout	Change in distribution of singularities
Empty BwO (ATP)		Death	Chaotic region	Randomness

The ontological status of virtuality, which Deleuze derives from his study of Bergson, helps us understand several features of material systems. First, it emphasizes that no one individuation exhausts the potentials for transformation inherent in the system. There is always the potential for "counter-actualization" in which an intensive individuation process will trigger a transformation of the capacities of the system; in model terms, the attractor layout changes due to a change in the distribution of singularities. Because of this potential for transformation, Deleuze insists that the virtual is not a field of possibilities, but of potentials. Second, Deleuze shows that the virtual field is structured by "Ideas," which he defines as sets of differential elements, differential relations, and singularities.

Dynamical systems methods are widespread in neurodynamics, showing the brain as generating wave patterns out of a chaotic background (= BwO: cf. identity emerging from difference). In any one act (perception, imagination, memory, etc.) the brain functions via the "collapse of chaos," that is, the formation of a "resonant cell assembly" of coherent wave patterns.

Let us look at some examples of neurodynamics applied to philosophical problems. Walter Freeman offers a dynamic systems account of the neurological basis of intentional behavior (Freeman 2000a and 2000b), while Alicia Juarrero uses dynamic systems to intervene in philosophical debates about decisions and intentional action (Juarrero 1999). The basic notion in their accounts is that nervous system activity is a dynamic system with massive internal feedback phenomena, thus constituting an "autonomous" and hence "sense-making" system in Varela's terminology.² Sense-making proceeds along three lines: sensibility as openness, signification as valuing, and direction as orientation of action.

The neurological correlates of sense-making show neural firing patterns, blending sensory input with internal system messages, emerging from a chaotic background in which subliminal patterns "compete" with each other for dominance. Once it has emerged victorious from this chaotic competition and established itself, what Varela 1995 calls a "resonant cell assembly" (RCA) forms a determinate pattern of brain activity that can be modeled as a basin of attraction. Over time, the repetition of a number of such patterns provides a virtually available response repertoire for the person.

In navigating the world, a person continually forms intentions, that is, leans towards things in outreaching behavior, as the brain settles into patterns. Once in a pattern, the system constrains the path of future firings, as long as the pattern or resonant cell assembly lasts. (Some intentions

entail long strings of firing patterns, yielding coherent complex behavior, as in the intention to play a game of basketball.) Sensory input continually feeds into the system along the way, either reinforcing the settling into a pattern, or shocking the brain out of a pattern into a chaotic zone in which other patterns strive to determine the behavior of the organism (= Freeman's "unlearning" or Varela's "breakdown" or DG's "BwO"). The neurological correlate of a decision is precisely the brain's falling into one pattern or another, a falling that is modeled as the settling into a basin of attraction that will constrain neural firing in a pattern. There is no linear causal chain of input, processing, and output. Instead there is continually looping as sensory information feeds into an ongoing dynamic system, altering or reinforcing pattern formation; in model terms, the trajectory of the system weaves its way in and out of a continually changing attractor landscape whose layout depends upon the recent and remote past of the nervous system.

Making the link with Deleuze, we can see the embodied and embedded nervous system as a pre-individual virtual field: (1) a set of differential elements (reciprocally determined functions – IOW, neural function is networked: there is no such thing as the function of "a" neuron; some argue the same for higher level cognitive processes, i.e., that they emerge from global brain activity and hence cannot be understood in isolation); (2) with differential relations (linked rates of change of firing patterns); (3) marked by singularities (as critical points determining turning points between firing patterns).

The dynamics of the system as it unrolls in time are intensive processes or impersonal individuations, as attractor layouts coalesce and disappear as singular thresholds are passed. Learning then is the development of a repertoire of virtual firing patterns as they relate to bodily interactions with the world. Any one decision is an actualization, a selection from the virtual

repertoire, that is, the coalescing of a singular firing pattern; this is modeled by the fall into a particular basin of attraction from the attractor layout "proposed" by system dynamics.

Here is another chart expressing these points:

DELEUZE AND NEURODYNAMICS

DELEUZEAN TERMS		MATERIAL SYSTEM	MODEL	NEURODYNAMICS	
Ontological status	Function			Short term	Long term
Virtual ("pre-individual")		Domain / capacities	State space	Differentials of neural function	Differentials of neural function
Intensive ("impersonal")	Field of individuation	Metastable field	Attractor layout	Chaotic firing	Neural plasticity
	Individuation process	Processes	Trajectories	Formation of an RCA	Forming a series of RCAs
Actual		Conditions	States	One RCA	Pattern of RCAs
Habits		Patterns of behavior	Attractors	Repetition of RCAs	Pattern of RCAs
Line of flight		Threshold	Bifurcator	Dissolution of any one RCA	Dissolving patterns
Body w/o Organs		Transformative conditions	"edge of chaos"	Instability	Neural plasticity
Counter-actualization		Transformation of domain / capacities	Change of attractor layout	Change of virtual repertoire of RCA patterns	Change of virtual repertoire of RCA patterns
Haecceities / Assemblages		Situations	Degrees of freedom	Extended system	Extended system
Empty BwO (ATP)		Death	Chaotic region	Cessation of function	Cessation of function

We can relate this notion to DR in which Deleuze refers to Leibniz showing Idea of sea as a system of differential relations and singularities. Thus he says Leibniz helps us think conscious perception as emergent from a differential field of tiny unconscious perceptions: the micro-sounds of the waves coalescing into the murmur of the ocean. Furthermore, learning to swim is then "conjugating" distinctive points of our bodies with singularities of the Idea of the sea in order to form a problematic field, a distributed / differential system of brain, body, environment. And any one exercise of swimming is a resolution of that differential field, an individuation.

Or, let's consider Bergson and memory in *Matter and Memory*. Memory also occurs via the formation of resonant cell assemblies, which means that Bergson is correct that the brain does not store memories (as actual wave patterns). Rather the brain possesses the (virtual) potential to generate (actual) wave patterns that produce memory effects. We thus have a thorough materialism, which, as long as it includes a notion of virtual as potential for generating actual patterns, can avoid Bergson's dualist invocation of "spirit."

Let's take it to a longer term temporal scale and a higher organizational scale, to the subject: adult fixed personality structures are actual (sometimes these are "Oedipal"), socialization practices are intensive processes or impersonal individuations that produce personality (in conjunction with the endogenous potentials of the child subjected to the practices), and the Idea of society is a virtual differential field (that is, the set of relations of practices) with pre-individual singularities as turning points for the production of one society or another.

POPULATION THINKING: THE MULTIPLICITY OF BODIES POLITIC.

Cognitive science, even the 4EA schools, is still beholden to two unexamined presuppositions: *first*, that the unit of analysis is an abstract subject, "the" subject, one that is supposedly not marked in its development by social practices, such as gendering, that influence affective cognition, and *second*, that culture is a repository of positive, problem-solving aids that enable "the" subject. So the second way to use Deleuze to take the next step in cognitive science is to turn to population thinking to describe the development and distribution of cognitively and affectively important traits in a population as a remedy to this abstract adult subject.

This is good biological thinking. According to Developmental Systems Theory (DST), we have to think about the social environment in which capacities develop. They are not genetically determined; genes are a developmental resource, but there are other resources, intra-organismic and extra-somatic, (e.g., recurrent social practices), that need to be taken into account. And once we're in the social realm, the cat is out of the bag. There can no longer be an abstract subject, but populations of subjects, with varying distributions of capacities. And the practices that produce these capacities can be analyzed with political categories. Following Deleuze's bio-political orientation, let's call the socially embedded person the "body politic."

So, for example, access to training in affective and cognitive coping skills, and hence the development of those skills, is differentially distributed with regard to the categories of masculine and feminine. Feminized and masculinized bodies politic have different "spheres of competence": a flat tire can appear as a mildly irritating challenge or as an insurmountable problem; a subway entrance as the enticing gateway to the city or as an anxiety-producing danger. Iris Marion Young's "Throwing Like A Girl" (Young 2005) is the classic piece in discussing the

restricted body competence of the feminized body-subject. Young's critique is aimed at Merleau-Ponty, in which the assured competence of the presumably neutral or non-gendered body subject hides a masculinist presupposition (see also Butler 1989).

But this is still too simple. It does no good to replace a single abstract subject, "the" body politic, with two abstractions, "the" feminized and "the" masculinized body politic. We need to think in terms of a range of gendering practices that are distributed in a society at various sites (family, school, church, media, playground, sports field ...) with variable goals, intensities, and efficacies. These multiply-situated gendering practices resonate or clash with each other and with myriad other socializing practices (racializing, "class-ing," "religionizing," "nationalizing," "neighborhoodizing" ["that's the way we roll"] ...). In other words, we have to think a complex virtual field of these differential practices, a complex phase space for the production of bodies politic, with shifting attractor layouts as the subjectification practices—intensive morphogenetic or individuating processes, to use Deleuze's terminology—clash or resonate with each other.

But even this is still too simple, as these gendering practices also enter into complex feedback relations with the singular body makeup of the people involved; these corporeal constitutions are themselves regionalized slices of the virtual, modeled with a phase space of what that body can do, its own habitual yet variable patterns of attractor layouts. These complex dynamics cannot be analyzed into a relation of independent and dependent variables, no matter how powerful the regression analysis one attempts in order to isolate their effects. There is no one magic element that enables us to find the key to gender or other politically important categories.

Lacking a population perspective on the development of affective cognition capacities, the abstraction of the embodied-embedded school impoverishes its notion of "cultural scaffolding"

by relegating the cultural to a storehouse of heuristic aids for an abstract problem-solver who just happens to be endowed with certain affective cognition capacities qua the ability to interact successfully with the people and cultural resources to which it just happens to have access.

But not every subjectification practice is empowering!

It's not just that sometimes you're denied access to an empowering practice. Some cultural practices positively harm individuals, instilling affective / cognitive traits that help keep them in subservient positions via an "internalization" of negative self-image and so on. This is not to discount raw coercion, but to call attention to its relative lack of importance in most social situations. As Deleuze says, following Spinoza: the wonder is that men will fight for their slavery!

The real bio-cognitive or "mind in life" question has to be the level of selection. Let's say that a certain distribution of capacity X holds in population Y. Why do we think we have had individual-level selection for reproduction of that trait, i.e., that each trait is adaptive for each subject? With group selection (selection for sets of subjectivizing practices that reliably yield a certain distribution of traits), then traits might be passed on that harm some individuals, but benefit the stability of the group in creating a dominant class who benefit from the disabling effects of those traits on the subordinate class.

Here we might have to distinguish biological fitness [number of offspring] from cultural "fitness": but this gets us into normativity, perhaps cross-cultural normativity, maybe even a discourse of "flourishing." More on this after we discuss affect more fully.

POLITICAL AFFECT

For our third point, we need to examine the connection between the use of "affect" in affective neuroscience and in Deleuze.

First, a negative distinction: although affect is felt, it is not equal to "subjective feeling." Rather, it can often precisely be "de-subjectifying" or "de-personalizing." (That is, affect can be the move from the actual to the "impersonal" intensive.) Just as for DG pleasure is the subjective appropriation of joy, subjective feeling is the appropriation of physiological-emotional changes of the body, the recognition that "this is me feeling this way." Deleuze and Guattari's point about affect's extension beyond subjective feeling dovetails with extreme cases of rage and panic as triggering an evacuation of the subject as automatic responses take over; drastic episodes of rage and fear are de-subjectivizing. Thus the agent of an action undertaken in a rage or panic state is the embodied "affect program" acting independently of the subject. Here we see affect freed from subjective feeling.

There can be no complaints about eliminating the "first person" perspective in studying these episodes of political affect, because there is no "first person" operative in these cases. Agency and subjectivity are split; affect extends beyond feeling; the body does something, is the agent for an action, in the absence of a subject.

This affect and body agency beyond the subject can be key in concrete problem of state violence. If political sovereignty = monopoly of legitimate violence, then the forces of order have to be able to act. But this is less easy than it sounds. So rages and reflexes and quick reactions are (always partial) solutions of this "problem."

Second, we have to appreciate the eco-social embeddedness of affect. Affect indicates that living bodies do not negotiate their worlds solely—or even for the most part—by representing the features of the world to themselves, but by feeling what they can and cannot do in a particular situation.

Deleuze and Guattari follow Spinoza, defining affect as a body's ability to act and to be acted upon, what it can do and what it can undergo. Affect has two registers. First, it is being affected, that is, undergoing the somatic change caused by encounter with an object; this aspect of affect can also be called "affection" as the composition or mixture of bodies, or more precisely the change produced in the affected body by the action of the affecting body in an encounter.

Second, affect is the felt change in power of the body, the increase or decrease in perfection, felt as sadness or joy. There are multiple possibilities here. The encounter can (1) enhance the power of one of the bodies and decrease that of the other (in eating, or in enslavement), or it can (2) decrease both (in a mutually destructive encounter), or it can (3) increase both (in a mutually empowering encounter, what Deleuze and Guattari call a "consistent" assemblage).

The primary contact with another being in the world is a feeling of what the encounter of the two bodies would be like; what the assemblage to be formed would be like (the mechanism for this felt imaginal encounter is what Damasio calls the "as-if" loop producing a "somatic marker"). As you move into an assemblage, you are de-personalized or de-territorialized: you form new habits. Now in this de-personalization you have to maintain homeostatic viability constraints, but that's only the "biological" vs the "political" organism: two very inadequate terms, as DG's whole point is that concrete "real experience" is bio-political.

Affect is the feeling for this variation; it is de-personalizing intensity as opening up access to the virtual, to the differential field, Idea, or multiplicity of the situation. As Brian Massumi puts it: "Affect is the virtual as point of view, provided the visual metaphor is used guardedly" (Massumi 2002: 35; italics in original). It is the feeling of change in the relation of bodies entering a new assemblage (you're always in an assemblage, that is, you are always an haecceity), and the feeling of how the present feeling might vary in relation to what might happen next in a variety of futures. Affect then is a resolution of a complex differential field, relating changes in the relations among changing bodies.

For DG, affect is inherently political: bodies are part of an eco-social matrix of other bodies, affecting them and being affected by them; affect is part of the basic constitution of bodies politic. Here we need the distinction between pouvoir and puissance. We will have to exaggerate differences for clarity, and need to remember that everyday French usage does not draw such clear distinctions. Nonetheless, we can say that pouvoir is transcendent power: it comes from above. It is hylomorphic, imposing form on the chaotic or passive material of the mob. In its most extreme manifestation, it is fascistic: it is expressed not simply as the desire to rule, but more insidiously as the longing for the strong leader to rescue us from the chaos into which our bodies politic have descended. Puissance, on the other hand, is immanent self-organization. It is the power of direct democracy, of people working together to generate the structures of their social life. The difference between pouvoir and puissance allows us to nuance the notion of joyous and sad affect with the notions of active and passive power.

Consider the paradigm case of fascist joy. The Nazis at the Nuremberg rallies were filled with joyous affect, but this joy of being swept up into an emergent body politic was passive. The Nazis were stratified; their joy was triggered by the presence of a transcendent figure

manipulating symbols—flags and faces—and by the imposition of a rhythm or a forced entrainment—marches and salutes and songs. Upon leaving the rally, they had no autonomous power (puissance) to make mutually empowering connections. In fact, they could only feel sad at being isolated, removed from the thrilling presence of the leader. They had become members of a society of the spectacle, to use Guy Debord's term: their relations with others were mediated by the third term of the spectacle the others had attended (the in-group) or had not attended (the out-group).

Political affect then includes an ethical standard: does the encounter produce active joyous affect? Does it increase the puissance of the bodies, that is, does it enable them to form new and mutually empowering encounters outside the original encounter?

CONCLUSION

How can we put virtual plus population of subjects plus affect together in context of Deleuze and cognitive science?

We can begin with a Deleuzian reading of Alva Noë's notion of perceptual content as virtual. This means that concrete perception happens as the resolution of a differential field, an Idea or multiplicity. The differential elements are movement and perceptual presence or appearance; the differential relations are those between these two elements; and the singularities thrown out in those relations as thresholds where qualitative perceptual change occurs (e.g., move too close to a pointillist painting and all you see are color dots, no longer forms) (Smith 1996).

I propose using our Deleuzean take on Noë's account as a model of political affective cognition as the perception of "social affordances." When we make sense of a situation, we determine the potentials in this encounter for making assemblages. That is, we let de-personalizing affect arrive. This de-personalizing affect as "sense-making" has different temporal scales: it is often an extended process of dynamic exchange / negotiation, but it can also arrive as a flash of insight, a feeling of what is possible. This feeling can be a definite reading of the situation ("this stinks!" or "this is for me!"), but it can also sometimes be just a vague feeling of good or bad possibilities ("I don't know, I can't quite put my finger on it, but just maybe ..."). Neurologically, intensive sense-making happens via Damasio's somatic markers generated by "as-if loops," which tell us what it would feel like to live through such and such a scenario.

Now if we want to use Noë's notion of virtual perceptual content to help us think affective cognition in its concrete political context, we cannot stick with the physical / visual vocabulary of a differential relation between "movement" and "appearance." The differential relation in the sense-making of bodies politic is that between potentials for becomings or assemblage formations which vary as the members of the encounter make a "move" in the social game, moves in which someone offers, commands, cajoles, persuades, pleads, and so on. The possible moves of a situation are the moves allowed by the social grammar and syntax (there is a syntax at work here in social situations: the order of moves is somewhat prescribed: some moves just cannot come after other moves). But of course such "grammar and syntax" are not propositional rules, but embodied competences which are affects or feelings for the potential. But these possible moves are themselves taken up in relations of change: what Deleuze and Guattari call "de-territorialization" (leading to what would be unexpected, because changing the allowable

patterns of the game) and "re-territorialization" (settling back into an old game, or setting forth the potentials of the new game) (Massumi 2002: 71-80).

To sum up, then, affective cognition unfolds in a social context between embodied subjects formed by that context. But "context" is too static: there are multiple levels and time-scales involved. That is, in de-personalizing affective cognition, we see bodies in concrete situations act in real time with response capacities that have crystallized over developmental time-scales as produced by multiple subjectivation practices in a distributed / differential social field. Thus a sense-making encounter, a de-personalizing case of affective cognition, is an emergent functional structure, a resolution of a dynamic differential field operating at multiple levels and different time-scales as those bodies navigate the potentials for the formation of new assemblages.

NOTES

¹ Instead of focusing on Deleuze's remarks on the brain, I'm going to develop my own Deleuzian-inflected take on current neuroscience, and more generally, on cognitive science. I think what I say is broadly consonant with DG's "From Chaos to the Brain" of *What is Philosophy?*, but I haven't put a lot of thought into it. For one thing, I don't really like WP; also, there isn't a lot in the "Brain" section that isn't highly figurative. Though I do appreciate what Eric Alliez does with it in *The Signature of the World*, as I indicate in my *NDPR* review. Basically, I'm not a big fan of "gulf-seeking" approaches to the relation of philosophy and science. I think we're all involved in trying to figure out how the world works, there's a lot of work to be done, and I don't want to spend too much time on methodology. If pushed to the wall, I'd say that the Deleuzian take on cog sci I propose avoids the science vs philosophy division of WP by being one of a "minor sciences" of ATP, or perhaps better, one of the "disciplines" of Professor Challenger: "bio-political affective cognition" or something along those lines.

² I have not yet attempted to articulate this notion of "sense-making" (drawn mostly from Varela) with Deleuze's *Logic of Sense*. I think there are resonances, but I don't want to make any firm judgments yet. Recall that for Deleuze sense is a "fourth dimension" of propositions; sense is what is expressed in a proposition. It cannot be reduced to referred objects, to speaking subjects, or to other propositions. "Sense is both the expressible or the expressed of the proposition, and the attribute of the state of affairs. It turns one side toward things, and another side toward propositions. ... It is exactly the boundary between propositions and things" (LS 22).

Now for Varela, sense-making goes much deeper than propositions. However, insofar as he upholds the "deep continuity of mind and life," there must be a development from biological

sense-making to the proposition. In a great article entitled "Organism: A Meshwork of Selfless Selves" Varela points to what he calls the "surplus of signification" opened by the sense-making of the bacterium: "There is no food significance in sucrose except when a bacterium swims upgradient" (87). Varela says this "surplus of signification" is "enacted"; it is not the internal representation of an outer fact. Can we say that this enacted sense is neither a reference to an object, nor the manifestation of a subject, but is "between" them, at their "surface"? If so, we might be on the track to articulating this biological sense-making with the treatment of the "dynamic genesis" of sense in the infant's body in the latter part of *Logic of Sense*.