

Notes on Antonio Damasio, *Descartes' Error: Emotion, Reason and the Human Brain* (NY: Avon, 1994)

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INTRODUCTION

Three topics in the book.

1. Neural underpinnings of reason: experience with a clinical case leads AD to posit that emotion / feeling (which are expressions of mechanisms of biological regulation) and reason are intimately linked. Feelings limit the decision space in which logic is used. Forecast: high and low level brain mechanisms necessary for reason.
2. Feeling = direct perception of a landscape of body; perception of body state. Feeling is not just in limbic system, but also in brain regions mapping and integrating body signals.
3. Body representations in brain are frame of reference for neural processes experienced as mind. IOW, the mind is about the organism's interaction with world; thus mind is embodied (and embedded), not just embrained.

PART I

Pathological evidence of emotion / reason disconnects

CHAPTER 1: Phineas Gage story.

Social problems from brain damage: changed character, though speech, motor skills, memory were unaffected. Debate between globalists and localists re brain function / anatomy relation. Note on phrenology: Damasio insists the "mind results from operation of each of the separate component, and from the concerted operation of the multiple systems constituted by those separate components" (15). So we have to talk about anatomical structure (different organs and regions of the brain), about specialized function of those organs and regions (e.g., Broca's area for language, hippocampus for episodic memory, amygdala for fear memory, etc.), AND about interaction of those distributed systems ("concerted operation" says Damasio, "transient functional cluster" says Edelman and Tononi, or "resonant cell assembly" says Varela). This is often thought of in terms of phase synchronization of firing patterns in distributed system. Thus we have to talk about neuroanatomy AND neurodynamics.

Further reading: Damasio, *The Feeling of What Happens*. Edelman and Tononi, *A Universe of Consciousness*. Cosmelli, Lachaux, and Thompson, *Neurodynamics of Consciousness*.

CHAPTER 2: Gage's brain damage.

More on the debate between globalists and localists: Broca's and Wernicke's areas.

Reconstruction of damage to Gage's brain. Very important distinction btw preserved, species-typical topological relations and individual topographic variation (23).

p. 24-30. Damasio stresses neuroanatomy ("the fundamental discipline in neuroscience"). Recent work stresses neurodynamics (again, the production of temporary coherent firing patterns among spatially and functionally distributed systems). (Edelman and Tononi are very good on the need to stress both coherence and difference. Too much coherence and you get epileptic seizures!)

p. 30: summary chart and important line: "the brain is a supersystem of systems." "System" is a very important concept in philosophy. Systems are emergent, that is, "the whole is greater than the sum of its parts." In other words, we see global focus via local constraint, or "reciprocal causality." But "downward" causality doesn't fit billiard ball model of efficient causality (localized and individuated elements). So we need to rethink Aristotle's "four causes." With systems, we have differential elements: "there is no such thing as an isolated X": thus, there is no such thing as an isolated neuron. Now of course you CAN isolate a neuron, but you can't isolate it and preserve its role in a functional system. The "meaning" of its role only comes from its differential relations with other elements. The classic example is phonemes. You can "isolate" the phoneme "f," but it only gets its "meaning" (its functional utility, its productivity in forming words) from the differential relations it has with other phonemes in a particular language. (They are "differential" relations because they change in other languages.) What's important about neurons is that they can play roles in different functional clusters or resonant cell assemblies, which we can analogize to different "languages" the brain speaks.

CHAPTER 3: Story of Eliot, a modern Phineas Gage.

That is, he can't make planning decisions. He wastes time on trivia and never gets to the big picture.

Damasio notes that Eliot's psychologist recommended psychotherapy, not making the connection between brain damage and personality change. He notes stigma attached to mental illness.

Many of Eliot's cognitive functions remained untouched. So D wonders whether social reasoning is different from abstract reasoning. D notes Eliot's lack of affect (no emotional reaction to disturbing pictures). Eliot retained a conceptual understanding of social convention. He could also generate options, assign consequences, match means to ends, predict consequences, and he was mature on a developmental scale of moral reasoning. Whence the difficulty in real-life performance?

D focuses on the difference btw lab testing and real-life performance. This is very important. Remember Haidt's concern with "ecological validity." One key is time constraint in real life: you're on the spot and must choose now. Also, each choice changes the conditions for future action. D calls this the "ongoing, open-ended, uncertain evolution of real-life situations" (50).

D hypothesizes connection of Eliot's low affect and poor real-life performance. His low affect made his "decision-making landscape hopelessly flat." Or, it made the landscape "too shifty and unsustainable." Possibly we have a "subtle rather than basic defect in working memory" (51).

CHAPTER 4: More clinical evidence.

Of course, emotion can disrupt reason. That is, too much or too uncontrolled emotion. But so can not enough emotion!

Results from other clinical cases point to pre-frontal cortices as key areas.

Discussion of anosognosia (denial of impaired performance) and association with right cerebral cortices (somatosensory region).

Discussion of damage to amygdala (fear conditioning).

Points of intersection of emotion and reason for social and personal domains: ventromedial prefrontal cortices and amygdala.

"there appears to be a collection of systems in the human brain consistently dedicated to the goal-oriented thinking processes we call reasoning, and to the response selection we call decision making, with a special emphasis on the personal and social domains. *This same collection of systems is also involved in emotion and feeling, and is partly dedicated to processing body signals*" (70; emphasis added).

Anterior cingulate cortex as source of "energy."

Neurotransmitters and neuromodulators: the brain is chemical as well as electrical.

Part II: Damasio's Theory

Chapter 5: Assembling an Explanation

D begins by sketching 4 factors in "neurobiology of rationality."

1. Decisions in uncertain and complex social environment require knowledge and reasoning strategies. The knowledge is about social world AND state of organism. The strategies are future oriented. So, world, self, and future of world and self.
2. Emotion and feeling (roughly, the objective and subjective aspects of changing body) are part of mechanism of biological regulation (homeostatic controls, drives, instincts).
3. Separate brain regions cooperate in producing images ("binding problem"). Synchronization of activity is the key.
4. Images about condition of world and condition of body require broad parallel display and higher-order working memory.

D's terminology: "organism" as whole, of which "brain" and "body" are parts. Organism is emergent whole of many systems, organs, cells. Autopoiesis at cell level; organizational closure at organism level.

"States" of organisms: D writes how a state is a "snapshot" of underlying process, "an artificial, momentary slice of life... Depending on the scale of analysis, the states of organisms may be discrete units or merge continuously."

I would use the term "condition" rather than "state" bcs what is registered is change in rate of change. Since all is process, that is, all is changing all the time. IOW, we have to learn how to think in time. Processes rather than states. Process philosophers: William James, Bergson, Whitehead, Deleuze.

Furthermore, what we have in production of body images is differentiation as deriving of instantaneous rate of change (of many processes) and integration of those "parcellated" images into a unity. IOW, the resolution of a differential field. Cf Edelman and Tononi.

Brain and body communicate both ways by both nerves and chemicals. This is very important: "brain receives signals not only from the body, but, in some of its sectors, from parts of itself that receive signals from the body." And it also receives signals from parts of its own internal self-monitoring sectors. Thus the brain synthesizes how the world is changing (sensory input, which is only a modulation on ongoing processes), about the body's being affected by the world's changing (proprioception or "somatic mapping," again, a modulation of ongoing processes),

about the brain's endogenous dynamics (modulation of ongoing internal neurological traffic or "meta-representations"), and about how the body would be affected were it to perform a certain action and hence be affected in turn by the world (off-line imaging, that is, modulation of ongoing stream of "somatic markers")! But more about all that later as D develops his theory.

"Mind" as internal image display, rooted in brain-body-world interaction.

Neurological traffic is NOT a one-way street of input / decision / output. There are always elaborate parallel streams w/ many feedback and feed-forward loops.

Integration of the distributed signals to form a unified "scene" via synchronization of neural activity. It's all about timing of firing patterns. Technically, phase synchronization is popular theory nowadays.

Images. A phenomenologist would object to the following line, saying D is confusing levels: "you are perceiving, and thereby forming images of varied sensory modalities. The images so formed are called perceptual images" (96). But we perceive things, not images. You can't confuse perception (personal / organism level) with neural activity (subpersonal level). Neural activity is undoubtedly the necessary condition of perception, but the enactive school would say that perception comes from "practical mastery" of relations of movement and sensation. Cf. Noë, *Action in Perception* (MIT, 2004).

Subjectivity / selfhood: ownership of images. Pre-reflective self-awareness as phenomenological issue. Zahavi has done a lot of work here. D will present notion of "core self" as "perpetually recreated neurobiological state" (100). Developed in *The Feeling of What Happens*.

Image storage and recall. Memory as *capacity* to recall (that is, interpretively reconstruct), that is, as capacity to re-activate firing patterns in sensory cortices. This capacity is controlled by "dispositional representations," that is, "potential patterns of neuron activity" (102) or "a dormant firing potentiality" (103). These dispositions are in other parts of the brain from the sensory cortices. Potentiality is a hugely important philosophical term. Following Deleuze, I would say the ontological status of such potentiality is "virtual." Deleuze always notes that Bergson made a great advance when he strictly distinguished virtual from possible. As always, it's all about differential relations between firing patterns (in the memory dispositions and in the sensory cortices).

D connects "knowledge" with dispositional representations. Innate knowledge is early and reliably developing dispositional representations in hypothalamus, brain stem, and limbic system. The infant has to know how to breathe, regulate its temperature, suckle, etc. Acquired knowledge consists of dispositional representations in higher-order cortices and in subcortical nuclei.

Thought is formed of images. Inattended to sensations can be recorded (revealed in priming experiments).

Neural development is NOT precisely programmed by genes. Our nature is to be open to nurture. However, most people do reliably develop species-typical structures and functions of lower brain areas. This is obviously the case for biological regulation / homeostasis. AND these lower brain systems constantly interact with higher brain systems. That is, our plans of action, formed in higher brain, are always "evaluated and shaped by a fundamental set of preferences of the organism that consider survival paramount" (111). These "preferences" are stored in the lower brain and are signaled to the upper brain by the emotional valuation system ("this is good" or "this is bad").

Chapter 6: Biological Regulation and Survival

The beginning of this chapter is standard stuff on homeostasis and instincts / drives, as well as on survival-based affective evaluation. A big question in all this has always been flourishing vs survival. Cf the Nietzsche / Darwin connection. Obviously survival is necessary condition, but knowing this, some social structures work to threaten survival to enforce hierarchy. This can channel surpluses to a few at the expense of many. So we have to think relation of biological and cultural evolution and thematize group selection of social structures. Much more on this as the course progresses.

Note on psychoneuroimmunology at 120.

D goes off the rails at 123ff, partly because he ignores social being of humans and our primate ancestry. It's not that we need "suprainstinctual survival strategies that have developed in society, are transmitted by culture, and require, for their application, consciousness, reasoned deliberation, and willpower" to keep us from "feeding frenzy, sexual assault, and murder."

This is a bizarre Platonic schema contrary to the thrust of his book (or at least what his book should have been, had it taken DST to heart). IOW, "society" is fully part of our biological / evolutionary history. You don't see those things in primate societies (or at least any more / less than in human societies, i.e., only rarely and mostly then in high stress situations) – or even for that matter in wolf packs or lion prides. What you see are social regulatory systems that become part of our bio-affective regulatory systems: our nature is to let nurture become second nature. You don't need "consciousness, reasoned deliberation, and willpower" to be an adequate social actor. That's the whole point of the Gage / Eliot stories. You need to have a properly attuned affective structure, so that the very thought of "feeding frenzy, sexual assault, and murder" makes you so sick you couldn't possibly perform those actions.

D continues with the following: "the control of animal inclination by thought, reason, and the will was what made us human, according to Descartes' *Passions of the Soul*. I agree with his formulation, except that where he specified a control achieved by a nonphysical agent I envision a biological operation structured within the human organism and not one bit less complex, admirable, or sublime" (124). But Descartes' error according to Damasio's whole book is NOT a metaphysical mistake (that is, D is not criticizing Descartes for being a dualist), but an overestimation of reason, that is, the false dichotomy of "animal" instincts / emotions vs "human" rationality.

He tries to finesse this position on 124-126, but the whole schema of culture on top of (or "added to") nature or reason on top of emotions or humanity on top of animality needs to be criticized and replaced, not refined.

Chapter 7: Emotions and Feelings

"Nature appears to have built the apparatus of rationality not just on top of the apparatus of biological regulation, but also *from* it and *with* it" (128; emphasis in original). But that's exactly why the previous chapter's formulations were unsatisfactory.

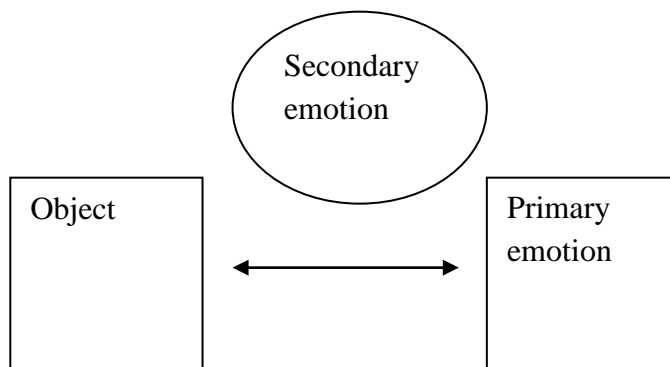
Emotion and feeling are the "bridge btw rational and nonrational processes, between cortical and subcortical structures." D distinguishes emotion as bodily reaction and feeling as subjective state, as "realization of nexus between object and emotional body state" (132). Feeling = "consciousness of emotion" (133).

My take on things: we have to see emotions as embodied appraisals (Jesse Prinz). Combines the rational / judgment appraisal theories (Stoics, Robert Solomon) and the bodily reaction theories (Wm. James). Thus we see cortical processes as shaped by but also modulating primary circuits.

Primary emotions. E.g., fear processing in amygdala as primary emotion. This releases chemicals and sends signals to cortex (dual processing): priming reactions and heightening arousal, i.e., lowering thresholds. This can be mechanism of trauma. PTSD. (LeDoux, *The Emotional Brain*).

In strong cases we get "affect programs" (Griffiths, *What Emotions Really Are*).

Secondary emotions arise when we form "systematic connections between categories of objects and situations, on the one hand, and primary emotions, on the other" (134). Have students draw diagram here:



Emotions as processes: "a profile of departures from a range of average states [that is, a process with certain rates of change held w/in standard values] corresponding to functional balance, or homeostasis" (135).

D's summary statement: "[secondary] emotion is the combination of a mental evaluative process, simple or complex, with dispositional responses to that process, mostly toward the body proper, resulting in an emotional body state, but also toward the brain itself (neurotransmitter nuclei in the brain stem), resulting in additional metal changes" (139).

"Feeling" is the experience of those changes. It relies on superimposed mappings in the somatosensory cortex of modulation of body condition signals ("dynamic newly instantiated 'on-line' representation of what is happening in the body now" [144]) and modulation of those representations by chemical means (145) AND an image of the thing (the way in which the world's constant changing has changed) that elicited the emotion (145).

The "self" has to play a role too: "a feeling about a particular object is based on the subjectivity of the perception of the object, the perception of the body state it engenders, and the perception of modified style and efficiency of the thought process as all of the above happens" (148).

D posits a third group of feelings, besides basic and secondary emotions: "background feelings." These are "the feeling of life itself, the sense of being." Its object is the "body state prevailing between emotions" (150). This is awkward: better to say it's the feeling of the normal range of body changes.

On the issue of "body image," see Shaun Gallagher, *The Body in the Mind* (Oxford, 2004), and the distinction of body image and body schema (a set of capacities for coordinated movement).

On the "transparency" of body vis-à-vis intentional objects, see Merleau-Ponty and Drew Leder, *The Absent Body* (Chicago, 1992). See also Richard Shusterman, *Body Consciousness* (Oxford,

2008), for positive practices of refining awareness of our "everyday" body. And Beauvoir and Iris Marion Young for feminist reading of the assumption of an empowered masculinized body in these analyses.

Next is one of D's most interesting points: the "as if" body loop: "emulators" in Rich Grush's terminology. Efferent copy from intentions is sent to sensory cortices, which read off what the body would feel like if it performed a certain action.

D insists again on importance of "self": feelings are NOT just readouts of current body state (161).

Body must have a means to "represent the causal link between the person or event and the body state" (161-162). See here Massumi and his resurrection of James's radical empiricism: the felt reality of relations. D insist on three factors: 1) representation / perception of modulation of ongoing world change (change in way the world is changing); 2) representation / perception of how the body is changing in reaction to the change in the world's change; 3) representation / perception of the relation of 1 and 2.

Chapter 8: Somatic Marker Hypothesis

Reasoning = deciding = selecting a response option. But not all decisions, i.e., selection of response options are result of rational deliberation. E.g., bio-regulation (body decides to activate hunger drive) or reflexes (flinches, ducks, startles, etc.). Also, not all reasoning is the same: personal / social reasoning vs abstract reasoning. (Greene will emphasize this latter distinction in discussing two types of moral judgment.)

In facing a decision, we generate lots of images of scenarios of possible action. What next? "pure reason" outlooks says we get to work with cost-benefits analyses. But what about multi-dimensional problems? How do we generate a common plane of reference? There is also problem of limits of working memory for symbolic processing. (Extension to pen / paper, etc.)

Marxist problem of abstract labor value: average social time for production: downward pressure on wages to biological survival: spatial politics important: have to create social gradients so that poorer people are more desperate and break solidarity: multi-cultural manipulation also important: it's capitalism that loves to exploit multi-cultural situations to divide the workers.

Somatic markers structure the decision space by tagging some options with negative or positive affect. Somatic markers are feelings generated by secondary emotions, connected by learning to predicted future outcomes of scenarios (174). This represents a "partnership" btw reason and

emotion (175). Touches on question of Theory of Mind and on deferred gratification. (But "jogging" shouldn't be suffering for later good. It should be its own pleasure. IOW, it should be praxis, not poiesis. And it is its own pleasure, if you attend to the process. And include the cool-down and after-effects as part of the total process: frame problem!)

Overall, I find D very naïve when it comes to culture. (e.g., 177; 200). He assumes individual adaptation is the goal of social structures. But we have to population thinking to see distribution of affective cognition traits and group selection: it's the social structure in competition with other social structures that must be the unit of analysis. And that social structure can be (and has most often been) hierarchical, unequally distributing empowering and disempowering affective cognition traits.

In any event, he proposes formation of dispositional representations (potentials to enact firing patterns) underlying somatic markers through associative learning. I'm happy with that proposal (180).

D proposes prefrontal cortices as convergence zone for 1) somatosensory regions of cortex for a) outside world signals and b) body state mapping and for 2) deep brain body regulation signals and for 3) categorization of situations (dispositional representations for combinations of things and events) – again, see felt reality of relations in radical empiricism. This is the "categorization of contingencies" (182) (cf. passive syntheses in DR 2). These categorized contingencies are the basis of production of rich scenarios (183). Finally, 4) prefrontal cortices are connected to motor and chemical response systems.

Thus we have a "three way link" among signals for 1) situations; 2) body states associated with those situations; and 3) systems that effectuate those body states.

Now we can have direct production of body states with are then mapped in somatosensory cortices (and then sent to the prefrontal cortex) AND the "as if" system: prefrontal and amygdala directly signal the somatosensory cortex, which then produces firing pattern that would have occurred if it had been reading body state. So we can say that the "as if" system produces "symbols" of somatic states (184). (D claims the as if system is result of development. This seems eminently plausible.)

Somatic markers can be overt (conscious feelings, albeit fleeting) or covert (unconscious). In the latter case, they can produce unconscious biasing of reason or intuition. (Hence link of development / embodiment of culture and moral / political intuition.)

Question of relation of personal / social reasoning and abstract reasoning. To be addressed in the Greene and Greene and Haidt articles.

Too much or too little emotion can hurt. What emotion can do is set up the proper frame for reason. Cf the "frame problem" in AI.

Somatic markers play role in total decision process, alongside mechanisms of attention and working memory. These structure the decision space. This is why there is no “frame problem” for (properly) embodied agents, as opposed to GOFAI agents.

Part III: Further Developments of the Theory

Chapter 9: Testing the Somatic Marker Hypothesis

The chapter begins with a review of the autonomic nervous system and its role in visceral signaling for background and emotional states ("gut feelings"). Explains galvanic skin response as stemming from sweat released by command of autonomic nervous system during emotional reaction. The whole thing is about our emotional sensitivity to images.

First he shows that frontal damage patients can exhibit autonomic system sweating measured by galvanic skin response via the startle reflex. But these patients don't show any skin response when shown emotional photos, even though they can intellectually explain the emotional "content" of the photos, the "fear, disgust, or sadness *of the pictures*" (210; emphasis added).

This is an extremely important little detail: we can say that the *affect* belongs to the pictures, while the *emotion* is produced in the body and the *feeling* is felt by the person. Deleuze builds his whole theory of art on these distinctions. Art works capture "percepts" and "affects" in themselves, which are "actualized" when viewed.

So here we have a splitting of knowing and feeling (211). They lacked the "dispositional knowledge pairing a particular fact with the mechanism to reenact an emotional response" (211). This "dispositional knowledge" is of course "know how," or "practical knowledge," even an embodied skill.

Damasio next describes the gambling experiments. He's proud of them, as they are better at "ecological validity" than a lot of lab experiments: real-time; punishment and reward in money; risks and rewards; uncertainty requiring hunches, since precise calculation is impossible (215). The frontal patients do very badly: they seem locked into the present; they have a "myopia for the future." This is probably due to lack of ability to generate somatic markers for scenarios with "as if" loops, an action that probably helps working memory and attention (219). Damasio repeats his theory that somatic markers structure decision space (221).

Chapter 10: The Body-Minded Brain

It's the whole organism, of which brain and body are parts, that interacts with the environment (224). Perception and action are linked as the organism modifies itself and the environment in pursuit of its metabolic necessities (225). Thus the mind is embodied and embedded as well as embrained (225-6). Neural circuits have evolved to monitor the brain / body. Thus body is more than just exterior support and source of inputs: "it contributes a *content* that is part and parcel of the workings of the normal mind" (226; emphasis in original).

Forecast of extended treatment to come: the self is a "repeatedly reconstructed biological state" (227). The self is a pattern, a repeated reconstruction, not a thing. And it's a pattern of an ever-changing organism. Bergson called this "duration": you're never the same, because the past accumulates; even if you're stuck in a rut, the rut is getting deeper and deeper.

Brain in a vat is silly, because the "vat" would have to be a body surrogate so precise that you have proved the point that the mind needs an embodied brain. Thompson 2007 is good on this.

Evolutionary treatment of consciousness in terms of adaptivity / increased survival of organism ("minded brains") (229 ff). So mind is conscious of state of body AND represents world in terms of modifications caused in the body by action of the world.

Three parts to the "primordial representation": 1) states of biochemical regulation in hypothalamus and brain stem ("states" should be "differentiation of ongoing changes"); 2) visceral state (including muscles and skin); 3) potential movements of "musculoskeletal frame."

This last bit about "potential movements" is extremely important. It connects with what Shaun Gallagher calls "body schema" (what Damasio calls "body schema" at 231 is what Gallagher calls "body image"). Gallagher's body schema is skilled know-how of bodily motion. It has to have access to the virtual, as realm of potentials. That is, the realm of differential elements (mutually defined motions), differential relations (linked rates of change of those motions), and singularities (thresholds for qualitative change). This is all linked to Noë's notion of enactive perception as sensory-motor practical knowledge, the ability to predict / control linked rates of change of sensation and body movement / action.

Double signals: we perceive objects and we perceive (proprioception) how the body changes in response to those objects. This doubling explains ownership of perception: "you feel you are seeing something with your eyes" (232). There is a "feeling of the body as it touched, or saw, or heard, or moved" (232). Most of the time of course this is pre-reflective, but it can be thematized.

Here we see the theme of the "transparent" body, effaced before its intentional object. Beauvoir and Iris Marion Young show feminist implications of self-consciousness of feminized body, i.e., body that is always object, even in being subject, never "purely" subject. Shusterman tries however to recuperate positive sense of body consciousness.

Theme of the "embodied mind." Historically important as "third" movement of cognitive science.

235: a very interesting point: "primordial representations of the body proper in action would offer a spatial and temporal framework, a metric on which other representations could be grounded." In other words, we move in a space that is related to the space of our movements, and our potential movements. Remember that the "body proper in action" is always a differentiation of ongoing body changes in relation to potential movements. The body is access to the virtual, or the body has a virtual aspect. Affect is this access or aspect. We feel what we can do.

Neural self from two sources. 1) sense of ownership of experience "rooted in a relatively stable, endlessly repeated biological state" (238): again, "state" has to be sensing differentials of ongoing processes (instantaneous rates of change) and integrating them to produce the "function" of total body process: finding the trajectory of the body in multi-dimensional "organism space": feeling "where you at" in relation to your history and your potentials generated by that history (are you on the cusp of a breakthrough? Are you stuck in a rut?). So we have dispositional representations of key events in your history, appropriately categorized, as well as "unique facts" and "recent events" and "plans," which are "memory of the possible future."

And 2) primordial representations of an individual's body: what the body has been like lately. "Subjectivity depends in great part on the changes that take place in the body state during and after the processing of object X" (239).

There is a lot to talk about in these passages on 240: "our metasef only 'learns' about that 'now' an instant later... The present is never here. We are hopelessly late for consciousness." It might shock and possibly dismay both of them, but Damasio and Derrida are very close here!

"Metasef" is awkward: Damasio is on the way to his refined theory, in *The Feeling of What Happens*, in which he distinguishes proto-self ("nonconscious collection of representations of the multiple dimensions of current organism state") and "core self" ("transient but conscious reference to the individual organism in which events are happening") (FWH: 199).

We won't go through all the details, but the payoff is at 242-3. We have neural representations of 1) object; 2) responding organism; 3) state of self in process of changing (differentiation of ongoing process) because of organism's response (representation of relation of causality). Representations of all these are held in working memory and attended to in early sensory cortices. Subjectivity emerges when brain produces images of "organism in the act of perceiving and responding to an object." Subjectivity is thus a sort of "third-party viewpoint," a "nonverbal narrative document of what is happening" to sensation of an object and proprioception of body's changes in response to that object.

Again, this is a representation of a relation: the relation between the object and the body, or more precisely, an integration of differentiations, that is, the culmination of

"calculations" of instantaneous rates of change *as they relate to each other*: a second-level integration of the differentiation of the differentiation of object changes and differentiation of body changes. IOW, the instantaneous rate of change of the relation between two linked rates of change.

Chapter 11: A Passion for Reasoning

A passion for reason = somatic markers that shape decision space: unconscious neural activity that can "emerge as feelings" or stay as "nonconscious biases to guide decision making."

"Socio-cultural implications": need to "protect reason" from "abnormal feelings or the manipulation of normal feelings." Here we see a whole corporeal cultural politics: normalization of corporeal practices in a culture. Again, we have to thematize this and not, in the name of liberal respect for privacy, cede the ground to the right-wing cultural warriors. At 247, we see the issue of children and representations of violence as desensitizing.

I think Damasio misses the point of his book when he says that for him Descartes' error was metaphysical dualism (249-50). Or at least that's not the real point, which is the separation of reason and emotion. That's a practical / phenomenological point, although grounded in metaphysics.

Damasio connects Descartes with functionalist idea that mind is software program which can be analyzed w/o regard to its hardware instantiation. For me, since I fully accept the embodied mind, the issue is not really fighting the assumptions of the computationalists, but fighting the lingering cognitivism and individualism of the embodied mind school. They are linked, as it's our affective structure that underlies cognition and that is formed in embodiment of culture via multiple subjectification practices responsible for distribution of traits in a population of subjects. Damasio helps with the first part (relation of affect and cognition) but not with the second.

Postscriptum

Damasio complains about mechanistic medicine and loss of biological view of the mind, both attributable to a "Cartesian" outlook. (Of course, one can say Descartes is only the reflection / marker of political economy changes that have the major role in subjectification / disciplinary practices that should be real object of study.)

He also points us to limits of contemporary neurobiology. Because of huge numbers of neurons and synapses, we have to concentrate on "interaction of firing patterns generated by many neuron circuits, locally and globally, moment by moment, within the brain of a living organism" (259). In other words, it has to be neurodynamics rather than micro-neuroanatomy (because of genetic under-determination, that is, essential role of developmental history, which has to include

cultural level analyses [260]). Neurodynamics must acknowledge local specialization of organs and regions, but organism level function is always emergent from interaction of functions in a distributed system.

BUT, and this is CRUCIAL, the "organism" is itself embedded in culture. It is only an "intermediate" emergent level; it is also a component of "social machines." And this is not purely a step-by-step hierarchy: social processes can skip the subjective level and shape physiology ("political physiology"), thereby shaping the subject from the inside (the above level reaches below for its "internalized" effects) as well as constraining it from the outside (laws, which regulate behavior according to "rational man" standard, and also RCT policies, which aim to produce context that produces behavior "as if" there were rational economic agents within, w/o really caring about internal processes at all).

D displays his individualist naïveté at 261ff in discussing culture. Selection pressures are for group practices, not individual benefit. That would only occur in egalitarian societies. Sure, we can say pleasure and pain basic circuits had individualist adaptive advantages, but not subjectification practices in hierarchical societies which dole out pleasure and pain in shaping the affective structure of individuals according to their intended role in the society.