

A Review of Antonio Damasio's Life, Feelings, and the Making of Cultures: The Strange Order of Things (2018, Vintage Press).

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The attentive reader will realize that that is not the actual title of Antonio Damasio's latest, most insightful, and provocative book. The "official" title reversed the two clauses, "The Strange Order of Things" is the title. I've taken the subtitle and promoted it simply because the cryptic title tells us virtually nothing about this wonderful book -- the subtitle reveals all. Damasio here is about continuing the voyage he began in 1994 with *Descartes' Error* and extending it to a logical and empirical end-point. Back then Damasio spotted a gaping lacuna in the research programs of those working in fields as diverse as the cognitive neurosciences, artificial intelligence, cognitive psychology, and associated endeavors in the philosophy of mind. Emotions, feelings, the domain of affect was almost entirely absent from scholarly discourse and empirical exploration. The dominant threads were tightly woven in with cognitive functions, with algorithmic underpinnings, and computationalism.

Moreover, as Damasio repeatedly emphasizes, these emotions and feelings take place, not in brains in vats, but in brains in bodies. We may think we think with our brains but the thinking cannot be understood without the body that, in coordinated cooperation with the attendant brain, feels. Taking this stance also, if nothing else, allows us to shift the nature of the ongoing (endless!) ruminating about Chalmers' (in)famous Hard Problem. More on this below.

The aspect of this stance of Damasio's that I found compelling back in '94 and still do today is how obvious his position is, how compelling his arguments have been, are, and will doubtlessly continue to be, and, oddly, how often they are either resisted or acknowledged in the breach. Despite the evidence and compelling argument, much of it expressed elegantly in this new volume, cognitive neuroscientists, AI researchers, and philosophers of mind continue to wander down affect-free paths where cognitive functions and brains are treated as isolated, detached from bodies that act and feel.

I think I understand why the field has shaped up in this manner. Cognitive functions lend themselves to digitization in computational programs. Emotions and feelings are more analog in nature and resist such representational formats. There are AI's that can play chess better than any human but none that allow the AI to experience the joy that a human experiences after winning a bruising multi-game contest. In fact, to put it more bluntly, no chess-playing AI even knows what chess is or cares that it doesn't. There's no knowing and, a fortiori, no feeling.

This neglect of emotions can be traced, in large measure, back to the early 1960's when philosopher Hilary Putnam put forward the bold notion that the human mind could potentially be captured by a computational system and that such a device, if it accurately instantiated human cognitive functioning, would display human consciousness. The proposal was quickly picked up by other philosophers such as Jerry Fodor and (somewhat later) David Chalmers, Daniel Dennett, and cognitive scientists like Douglas Hofstadter. Putnam dubbed it *machine state functionalism*; it's also known as *computational functionalism* and *hardware independent functionalism*. But by any name the framework is one bereft of affect. In this domain there is no talk of emotions, of feelings, of joy or suffering and, in Damasio's view, the approach is doomed as a model of anything interesting that we, or any other species, does.

Putting it another way, Damasio is wisely telling us to stop looking for our lost keys under the street lamp. We know we really dropped them over in the bushes where it's dark, messy, muddy, and hard to even get in there to begin the search.

The important move that Damasio makes is proposing *homeostasis* as the biosocial mechanism that links affect with "life, feeling and culture." The appearance, growth, and maintenance of a system, any system, be it an individual cell, the full complex interlocking elements of a multicellular organism, a group of conspecifics coordinating their functions and behaviors with each other, or a full complement of humans engaged in the formation of a society, is based on achieving some form of maintainable balance between the variables that drive the system. In Damasio's framework, homeostasis does the heavy lifting.

This framework is important from a philosophy of science perspective for reasons that are often glossed over in such discussions: scientific argument, in order to be explanatorily useful, is mechanistic. It is simply unsatisfying to try to present the operations of a system without identifying the underlying process or mechanism that plays a causal role in the observed effects. Without such a mechanism claims are and should be viewed with a nuanced agnosticism and studied skepticism. Newton's characterization of gravity as action at a distance was seen as seriously problematical until Einstein provided the mechanism through which it operated. Wegener's hypothesis of continental drift was looked upon askance until the discovery of mid-ocean rifts. The various anatomical and behavioral relationships among species were laid out by Linnaeus in the middle 1700's but it wasn't until Darwin identified natural selection that zoologists fully embraced evolution.

Critically, Damasio's homeostasis is a *general* mechanism that operates with any system, from the most basic prokaryote life-forms to the various psycho-physiological functions of multicellular species, to collations of individual organisms functioning in groups, to collectives coordinating their operations in human civilizations. Damasio's homeostasis has an engaging "Goldilocks" quality. It operates within a range of reaction that is satisfactory (i.e., "just right") for the system rather than some idealized set-point. The system fluctuates between boundaries,

beyond which the affect experienced becomes unpleasant and adjustments need to be made to bring the system back to tolerable levels.

Damasio's embodied approach, as noted, allows him to sidestep the question that will not go away, Chalmers' Hard Problem or "How does the brain make the mind?" – because in Damasio's world it doesn't. The self-awareness of consciousness, the subjective nature of cognition, the expression of feeling, all the features that make minds are the result of the contributions of a host of factors and most of them have links to and origins in the periphery, in the body, in sensorial, neuronal, hormonal, biochemical processes. As he notes, "The fact is that the [brain's] signals are never purely neural to begin with and gradually change along the way to the central nervous system." Brains are in bodies; together they make minds. It is an existential mistake to consider cognitions without feelings, to focus on the computational elements of learning, memory, decision-making without incorporating the affective and bodily factors that accompany them, motivate them. A model that neglects feeling will have precious little explanatory power when it come to the "big picture" aspects of the human condition that so fascinate Damasio.

Though he doesn't cite them, Simona Ginsburg and Eva Jablonka's recent book on the issue of when and how consciousness emerges, fits nicely with his. They have their own explanatory mechanism, a bio-neural acquisitional system dubbed Unlimited Associative Learning (UAL), which allows an organism to acquire critical information about the world and make adaptive adjustments in behavior and internal representation. Consciousness, in their framework, only emerges in species that have evolved a functioning UAL. It's not hard to see the parallel explanatory roles of Damasio's homeostasis and their UAL. Like Damasio, Ginsburg and Jablonka assume that sentience requires a functioning nervous system, a position I take issue with and pursue below.

Damasio has a short section on religion which, not surprisingly, focuses on the role homeostasis plays in the development of cultures. He comments, approvingly, on the classic Durkheim position that religion's likely origins lie in "the collective rituals of tribal people" while noting that the establishment of such behaviors "are likely to have been by homeostatic instabilities in the first place."

I appreciate that it isn't always diplomatic for a reviewer to muse on what's not in a book (in particular this one which extends over a remarkable range of topics) but I wish Damasio had touched on the interdisciplinary approach to the origins and roles of religion that psychologists, anthropologists, and philosophers such as Ara Norenzayan (2013), Pascal Boyer (2001), and Robert McCauley (2011) have introduced (though he does cite Scott Atran, one of Norenzayan's collaborators). While not phrased in Damasioan terms their work identifies a number of factors that have affective, emotive, and homeostatic components. One of the core assumptions is that early forms of religiosity likely emerged from *agent detection*, an evolutionarily old and essentially universal mechanism that alerts, for example, a prey species to the possibility that the

rustle in the bushes is a predatory agent and tunes a predator species to the prospect that the movement in the grass is lunch. With the evolution of symbolic representation it was a simple step to induce agency into the abstract, into cloud formations, the unpredictability of weather, of sickness, death, and the many mysteries that surrounded and confounded early symbol-embracing hominids.

Norenzayan develops an even more intriguing thesis that religion functioned as an essential driving force in the emergence of large-scale societies arguing that, without the moral guidelines that religion established, social groups would be limited in scope and size. Punishing transgressions of cultural norms, an inherent element in all social systems (including bacteria, as Damasio notes), only works when the social unit is small, where the violations are noted, observed, and can be dealt with locally. This mechanism cannot operate in large anonymous collectives where someone you do not know and may not trust has abrogated the norms you and yours have established. What is needed is a "big god," an entity that sees the transgressions that occur away from the original tightly-knit group, establishes cultural norms and a moral code that all members of the larger social system embrace. In Norenzayan's view, religiosity and civilization mutually bootstrapped each other into their roles as mainstays of extended human social systems. Norenzayan's model sits comfortably in Damasio's wheelhouse. I hope he takes a look in his next book (for with Damasio there is always a next book – as he hints in a footnote).

Finally, I have to touch on a point of disagreement between Professor Damasio and myself and it's on a matter of importance: the origins of minds, of consciousness. In *The First Minds: Caterpillars, 'Karyotes, and Consciousness* I developed the Cellular Basis of Consciousness (CBC) model based on the assumption that sentience, consciousness is co-terminous with life. All living organisms have, from the CBC perspective, an internal, subjective, valence-based sentience. All species, including unicellular prokaryotes have minds, primitive but existentially secure ones. Damasio wrote a blurb for my book where praise was offered while noting that "It is not necessary to agree with all the ideas advanced in Reber's new book...." And this, the co-terminous nature of life and mind, is the point where we part ways.

However, in large part, my CBC model is actually Damasioan – the theory begins with the assumption that the first glimmerings of consciousness, of a mental life, are affective and based in feelings. In my view life begins with emotions, with valenced sensations, with the capacity to detect, experience, and react to the good and the bad, the nutritious and the toxic, the pleasing and the painful. Damasio discusses this position in several places, in particular when describing the remarkable array of behaviors that have been observed in unicellular prokaryote species. However, these passages contain repeated demurrals, comments to the effect that we need to take care *not* to endow bacteria with sentience, that merely exhibiting behaviors that look like carefully crafted schema for avoiding conflict, communicating distress or satisfaction both within and between kin-related collectives, that evidence for learning, establishing memories, engaging in what looks an awful lot like a primitive form of altruism should not be taken as evidence for the existence of awareness, subjectivity, a mind.

In taking this stance Damasio joins a lively band of researchers and theoreticians who have mused at length on the issue of the origins of mind such as Todd Feinberg and Jon Mallatt (2013), Colin Klein and Andrew Barron (2013), Peter Godfrey-Smith (2016), Daniel Dennett (2017), and of course, Ginsburg and Jablonka all of whom similarly conclude that it is a bridge too far to grant consciousness to the unicellular.

I find this position puzzling because there are no fundamental, biomolecular, evolutionary reasons for it. Bacteria are homeostatic organisms; they respond in adaptive ways to temperature gradients, nutrient concentrations, light levels, the toxic molecules in their surrounds. Damasio simply states that prokaryotes cannot be conscious, do not have sentience, that their highly adaptive responses are robotic or, as Dennett put it, displays of "competence without comprehension." But no in-principle reason is presented. He simply proclaims that bacteria are "un-minded," that a nervous system is a requirement for sentience. It is difficult for me to understand this singular reluctance to bite the metaphoric bullet and recognize that the remarkable, astonishing array of behaviors observed in bacteria are, indeed, evidence of that cherished mental state, consciousness. Prokaryotes are sentient; they feel. When bacteria make metabolic adjustments in response to concentrated salt solutions (see Mathis & Ackermann, 2016) *they do so because it hurts*.

I think I understand the concerns, the worry that the very notion of a paramecium with a mind, the conception of an amoeba with awareness, the wild leap to, as Thomas Nagel would put it, that "there is something it is like to be a bacterium" seems like a line most are unwilling to cross. I felt this way not too long ago (see Reber, 1993) and cell biologists with whom I've corresponded over the last several years felt similar reticence. One prominent British biologist told me about his experience when, in a conference presentation, he offered the possibility that prokaryotes might be self-aware. It was greeted with such howls of derision that he backed off the very thought for nearly a decade.

But unless Damasio and others can find definitive biomolecular reasons why a single-celled species cannot have subjective experiences the default position should be that life and consciousness are, indeed, co-terminous. When you get life, you get sentience. When you introduce anesthetics to a living creature, it is suppressed. When the compound wears off, it re-emerges. When life ends, subjectivity, sentience ends with it. In a recent paper (Baluška & Reber, 2019) this position is developed in more detail and several candidate biomolecular mechanisms that might be responsible for generating sentience are proposed. Interestingly, the candidates we considered are based on membrane excitability, irritability which Damasio himself has cited as a likely factor (see Cook, Carvalho & Damasio, 2014).

Life happened once on this planet. From my perspective, sentience happened once as well. They co-occurred. All living things, extant and extinct, descended from that singular, near-miraculous event some 4.5 billion years ago. All forms of sentience, affect, and cognition similarly evolved from that moment. Importantly, nothing else in Damasio's splendid telling of

how we got to where we are as a species needs to be adjusted, not a jot nor a tittle. His scholarly edifice holds equally well whether or not bacteria are sentient. He would also rescue himself from a problem he barely acknowledges (but needs to): How did the insentient become sentient? How did those nonconscious, robotic, un-minded, unicellular species transition to ones with consciousness? What drove this remarkable transformation? And why is a nervous system necessary?

I guess I'm counting on Damasio's honorable stance. As he states, "I am open to listening to counterarguments and changing my opinion." I am as well. The debate will doubtlessly continue.

That point of departure aside, the beauty of Damasio's book is found in the ease with which he is able to begin with a simple proposal and leverage it to provide a novel perspective on the creation of cultures, the emergence of societies, the great expanse of humans living in large, (more or less) functioning collectives. Before he is done, religion, art, literature, medicine, morality, governance and more come to be viewed as systems driven by the "homeostatic imperative." The vision is compelling. When Damasio puts pen to paper or, in this digitalized age, fingers to keyboard, provocative, novel, and inviting proposals invariably emerge. Is it possible to squeeze all this explanatory power out of a singular mechanism? Probably not but, as with all innovative ideas worthy of examination, it will be tested, explored, and the envelope pushed. We'll see what emerges.

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