Human Values, the Biology of Emotion, and Innate Spirituality

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"The heart"—as opposed to human mind—has long been metaphorically represented as the organ of moral conscience, the symbolic center of compassionate care, nonviolence and cooperative grace, as well as the fount of spiritual revelation. New science suggests that this time honored folk symbol is neither naïve accident nor religious error, but rings deeply true. More, this colloquial wisdom about the human heart can be clarified, enhanced, and fully honored once we understand the physical underpinnings, the evolutionary breadth, and biological function of the process we experience as *human emotion*—the heartfelt experiential core of this common wisdom.

With the term "human emotion," I mean such everyday feeling experiences as joy, sadness, courage, fear, gratitude, anger, disgust, delight, trust, mistrust, admiration, envy, love, and hate—familiar feelings, undergirded by common biological structures and processes across the human family. But until recently, science (and hence our educational system) has largely overlooked the crucial role the emotional system plays in the functioning of the living organism. We remain generally unaware that each feeling *does something* and *means something*, both *moving the body* and *in-forming the mind* in ways that keep us optimally integrated, balanced, and healthy. They are complex subjective servants of an ancient evaluative guidance system, one conserved across our vast evolutionary history, performing many of the same functions that the old Vitalists attributed to some nonphysical force or identity component such as spirit or soul. Together our pleasurable and painful categories of feeling serve as universal ecological *biovalues*; they encode an ancient evolutionary logic, undergirding all semantic language and human value systems. They, quite literally, build the deepest foundations of "mind" in living systems; they remain central to all aspects of human development, moral conscience and spiritual experience, ultimately delivering the collective "wisdom of the heart."

This new science suggests that the ethical naturalists had it right; that the "naturalistic fallacy" (Moore, 1903)—the decree that that values do not exist empirically in nature—was a paradigmatic misstep that has left a cavernous void in our self-understanding. It has preemptively forced philosophical discussions of ethics, morality, and social justice to the outskirts of relativism, saddled us with an inescapably hardwired "selfishness," and left us questioning our very free will. Many unfounded folk assumptions and religious dogmas have subsequently poured into that void, the worst of which twist emotion into evidence of our "fallen," "sinful," or "evil" nature. Fortunately, with the new science to identify and replace any ill-fitting pieces of the puzzle, an entirely new picture of human nature and human potential begins to emerge.

Exploring this "new picture" of our humanity involves four inter-connected movements. The first is the evolutionary account of how the emotional side of our life came to be—starting with the sentient workings of the earliest forms of life where its deep evaluative logic is to be found. Then continuing on with the emergence of new forms of structural complexity that eventually undergird our judgments of what is "good, true, and beautiful." The second movement concerns how emotions work as the drivers of our thought processes, how they integrate all aspects of our identity, and how our everyday feelings can be mined for not one but three levels of guidance information. Third, we will then delve into their deeper physical underpinnings and the more esoteric, perhaps sacred, dimensions of self-identity implied within

that range of guidance. Fourth will be an exploration of the implications of this paradigm for spirituality, including a reinterpretation of the Genesis account of Adam and Eve's exit from the Garden of Eden. This chapter will be complemented by a second chapter in Volume 2, one that takes this exploration of emotion-based guidance of thought into the realms of values, ethics, justice, and violation.

THE EMERGENCE OF EMOTION AS SELF-REGULATION

Here we explore the biological function of emotion and how our feelings encode evolutionary biovalues, which provides the basis for an examination of how emotional guidance yields optimal health. As for the underlying science, Neil Theise has elegantly set the stage for this discussion (see Microscopes & Mystics), as these *self-regulatory* dynamics are essential components of the universal, creative, *self-organizing processes* he describes*.* They do indeed facilitate our re-enchantment and spiritual self-understanding, as they add the missing *evaluative* dimension, and they speak to the many nuances – and biophysical scales - of *self-identity*.

Emotion is a Sense

The central message of this new science is that humans (and indeed all living systems) are *emotionally sentient*. What this means is that emotion is best understood as an *ancient sensory system*, perhaps the first to have emerged—the grandfather of all other senses, concerning the well-being of the organism within its immediate environment. In its simplest form, the emotional sense delivers a core good or bad *evaluative experience,* a "self-regulatory" feedback signal concerning an ecologically relevant change that is "good for me" or "bad for me." Without conjecture to whatever experiential form these binary evaluations might take in any given species, we humans feel them as the *pleasurable* or *painful* categories of emotion; their ancient evaluative logic still is present in all the higher senses—in resonant or disturbing sounds, in aesthetic beauty and ugliness, pleasant and unpleasant odors; and in warm fuzzy or cold prickly experiences of touch.

More, the emotional sense also has a motivational, *behavioral* component. Emotional feelings move us to actions—certainly the well-known four F's (feeding, fighting, fleeing, and fornication), but more generally the dual behavioral categories of approach or avoidance, responses that are coupled to the binary signals of pleasure and pain, respectively. At its earliest emergence (well before brains or even nerve nets evolved), emotional feedback signals delivered not only the first form of sensory-motor control, but also the first mechanism of *adaptive immunity*—a molecular "memory" and learning system still evident in sensorimotor circuitry of the E. coli bacterium—that leads a primitive organism out of danger and toward an environment where it can thrive.

While this circuitry has been described in detail elsewhere (Peil, 2014), the key functional point is that it maintains homeostatic balance via a little 3-step cybernetic regulatory control loop, akin to a home-heating thermostat: A sensor *compares* the outside temperature to the setting on the dial; a controller *signals* when mismatches occur, triggering a *correction*, turning the heat on or off. In a living system, the emotional sense uses the same crucial steps: 1) *comparing* the self against its not-self environment, 2) *signaling* when imbalances occur (the feeling), triggering a *corrective response* (the approach or avoid behavior). Indeed, the thermostat is more than a metaphor here, as the internal "settings" of this ancient sense are the chemically favored states in terms of the laws of thermodynamics, and the regulation it delivers is the postponement of an inevitable entropic destiny: life itself.

So together, feeling signals and their coupled corrective behaviors deliver the "hedonic" (Bolles, 1991) quality of life: Movement of the creature toward that which is beneficial and away from that which is harmful—a pattern of behavior observable across the entire animal kingdom from single-celled creatures to complex humans (Medicus 1987). Furthermore, the deep structural and functional coupling of pleasure and pain with approach and avoidant behaviors set the evolutionary stage for *all higher learning,* serving as the ultimate "unconditioned" stimulus-response pair in Pavlovian conditioning (Pavlov 1927), still undergirding our evaluative perceptions and memories of reward and punishment.

In short, in our earliest ancestors, the biological structures for *controlling behavior* and *maintaining physical health* were one and the same. Our modern emotional sense continues to deliver the triple whammy of *evaluative signals* that trigger self-correcting *behavioral responses* (restoring homeostatic balance to the organism in the present), as well as fostering *adaptive development and learning* that forges evaluative memories of the past and directional, goal-seeking motivation for the future. Once we recognize that emotion functions as an evaluative sensory system, like the answer to a good riddle, we wonder how we could have ever overlooked it. But we have, and with grave consequences to our health and well-being, for its functional significance is biophysically non-negotiable.

Evolutionary Biovalues Encoded in Emotion

Indeed, as vision is to eyes, and sound is to ears, the biological function of the emotional sense is that of *self-regulation*, an ancient function best understood in the context of the original structural unity of behavioral control and health vitality, a singular mechanism utilizing feelings as *regulatory feedback signals* relevant to both. (In Neil Theise's prior discussion, these are the required negative feedback loops that yield cybernetic control, but are also dynamically coupled with positive loops, to yeild the balanced "edge-of-chaos" (Langton, 1990) *quenched disorder* required for life). The binary feedback signals we experience as pleasure and pain are the "basic operating system" underlying "affordances," the visually recognizable good or bad features of the environment that afford organisms life-giving benefits or threaten immediate death (Gibson, 1979). The guidance they offer cannot be overemphasized, for they, quite literally, endow all living systems with the power of direct, creative participation in the evolutionary process.

For at their deepest core, pleasure and pain offer a subjectively meaningful inroad to *the logic of natural selection.* They serve *two universal evolutionary imperatives*, two self-regulatory *purposes* if you will: Pain serves the evolutionary purpose of *self-preservation*, protection of the body proper, offering informative corrective guidance away from all things destructive to life ("survival" in Darwinian terms). In fact, our basic pains (sadness, disgust, anger and fear) are quite literally "distress" signals (Selye, 1957), still intimately connected with the physical immune system (Pert, 1988, 1998) as well as genetic and epigenetic regulatory processes (Peil 2014). These basic distress signals ask for specific corrective actions that *reduce* the harmful *external environmental conditions* that elicit them, or at least to avoid or retreat from them, as surely as the bacterium changes course away from a toxic chemical gradient. For modern humans, this external environment also includes all of our sociocultural institutions, power structures, and regulatory authorities, those that enable and constrain our self-regulatory agency. In short, pain mediates our immediate *being* in the world.

Pleasure, on the other hand, serves the counterpart evolutionary imperative of *self-development* (Darwinian "adaptation"), but as an *experiential* addition to his morphological adaptations of organic function, structure, and form. This self-developmental imperative captures the role of behavior in niche construction (Odling-Smee, Laland, & Feldman 2003) and any Baldwin effects in evolution—any heritable

effects of learned behavior (Simpson 1953; Weber & Depew 2003). But the term "self-development" also adds richness and nuance as it concerns adaptive *development of the mind*, empathic expansion of the identity boundaries, and *actualization* of all *identity potentials*. The corrective self-developmental response to good feelings is about taking note of new and beneficial circumstances, making *internal* changes, building an optimal mindscape—no matter how meager or potentially complex that mind can become. Beyond the "evo-devo" (Carroll, 2008) comparisons of species development, this self-developmental imperative is largely missing from the Darwinian model, wherein the informative aspects of positive emotion were largely limited to the function of sexual reproduction. In this new picture, however, positive emotion is the creative driver of individual growth, psychosocial and moral development, as well as the engine of sociocultural evolution—feelings instrumental in our *ongoing becoming*, from simple joyful surprises to the complex beacons of wonder, curiosity, trust, honor, and agape love. (As Vern put it previously, the feelings associated with the mimetics of blessing.)

Even better, the new emotion science recovers the strand of truth in the Lamarckian story, wherein the here and now behavior of the organism, most particularly its "felt needs" played a central role in evolution (Lamarck 2011). What we know now about neural development and plasticity (Erickson & Kramer, 2009) and the epigenetic (external to genes) regulatory and inheritance processes (Jablonka & Lamb, 2005), it is clear that Lamarck had intuitively captured the self-developmental imperative, even noting the role of hedonic self-regulatory feelings. This updated Lamarckian story also replaces the lost link between emotion and physical health, honoring the functional fruits of good feelings for far more than those of lusty desire. For joy and its complex blends and shades are what Hans Selye originally called "eustress," the good kind of physical stress that fosters fortification, expansion, and complexification of the self (Selye, 1957). While completely omitted from our current understanding of stress, eustress signals are the innate biological rewards, the Pavlovian reinforcers of optimal adaptive learning, with both the anticipatory desire (temporally oriented toward the future) and joyous rewards (with recognition of the past journey) informing us of successful self-developmental progress.[1]

Emotional Guidance Yields Optimal Health

Yet even the development of the complex positive emotions themselves are markers of an optimal pattern of neural development, a pattern with liberal cultural and linguistic flexibility as well as some hardwired, biologically non-negotiable, self-preservationary processes, and epigenetic developmental windows. Such nuanced good feelings as: curiosity, trust, gratitude, admiration, compassion, love, loyalty, devotion, authentic pride and happiness, wonder and spiritual unity, are all *biomarkers* of optimal physical, mental and social functioning, and actualization of innate potentials (Peil, 2012). They are the developmental beacons and rewards of finding and staying upon the True North "right track" of being and becoming. It comes as no surprise then that this suite of complex positive emotions are also those advocated across the religious traditions as the most virtuous and Godlike, for they collectively constitute the wisdom of the heart. Conversely, the complex negative emotions (i.e. shame, mistrust, envy, contempt, rage, hate, etc), have been associated with moral corruption, sin, and evil—for they are indeed biomarkers of long-term self-regulatory deficits, lingering physical distress, and of a more limited (if not self-destructive) life trajectory. But this is only because they are *informational messengers*—and we have largely ignored their crucial self-preservationary message.

[1] This aspect of temporality maps onto Paul Ricoeur's concept of ipseity, which includes time and constant change, something reflected in narrative.

In sum, emotion is an ancient sense that provides regulatory feedback balance and behavioral control, mediating protection of body and ongoing development of the mind. While this function may have had humble hedonic beginnings, in its fully intended usage here "self-regulation" is now a physically, biologically, psychologically, and sociologically sweeping term that comes fully loaded: It ranges from

- general auto-generative participation in the deepest self-organizing dynamics of the universe;
- through autocatalytic and autopoietic self-making and autonomous agency, self-repair, self-replication, self-preservation, self-development, and self-directed agency in living systems of various complexity;
- to the self-determinism, to the self-discovery, empathic self-expansion, self-actualization, and mindful self-control in humans.

All of these are "self-relevant" (LeDoux, 1989) and engage some aspect of the emotional system, whether we are aware of it or not. This general paradigm of emotional vitality becomes more complex when looking at the human condition.

HOW EMOTIONS INTEGRATE THE SELF

In this section we examine the way emotions integrate the complex aspects of the human "self." We start by looking at the body as whole being a sensory organ; this will lead to an examination of the role of neuropeptides in producing complex "molecules of emotion" (Pert 1998). This will become the basis for resolving five Cartesian mind-body conundrums.

Sensory Organ: The Whole Self

One might ask at this point, as eyes are to sight, and ears are to sound, what is the sensory organ for emotion? The quick answer is *the entire body,* as it is replete with physical and chemical stimulus-response regulatory mechanisms that play a role in the emergence of emotional experience. The more nuanced and precise answer is that it spans the entire conceptual sphere of *the self*. With varying degrees of intensity, feelings grab and direct our attention to self-relevant events, those concerning any physical, mental, social or spiritual aspects of our identity.[2] Hence, the three levels of information encoded in emotional feelings are asking us to make specific sorts of self-corrections that concern 1) regulatory stability and immune defense of body; 2) the ongoing adaptive development of the mind; and 3) the evolution of social empathy and ongoing personal "spiritual" growth, toward the actualization of all innate potentials.

In its general essence, "the self" is a linguistic symbol for any subjective awareness that might be available to a living system, any personal experience of itself as a stable bounded body situated within its ever-changing environment. The boundary could be anything from a cell membrane, to scales, feathers or skin, but it demarks everything inside as the *body-self* as distinct from its external "not-self" world. It also has structures (eyes, ears, nose) for sampling the world, making ongoing comparisons that allow detection and response to self-relevant changes in external environment. The most ancient of these sensory structures is the ubiquitous lock and key *ligand-receptor* mechanism on the cellular membrane,

[2] David Bohm emphasizes the importance of becoming aware of all of the different dimensions of feeling when in dialogue with other people. He uses the term 'proprioception' to refer to this heightened state of awareness, which can make the exchange of meaning much more profound, generative, and rewarding.

with transmembrane protein receptor complexes responding to *peptides* that instantiate biorhythms, genetic, and epigenetic regulatory processes, cellular communication, and immune function—chemical signals known as the "molecules of emotion" (Pert, 1988; 1998). The new view of receptor complexes, however, replaces the old one-lock-one-function idea with a *computational* view, that the ligand key potentially initiates the orchestration of many functional "feedback motifs" (Brandman, et al, 2005; Brandman & Meyer, 2008) that are central to the self-regulatory story. In multicellular organisms with nerve nets or brains and fancier sensory organs, this same chemistry delivers the "bottom-up" stream of "interoceptive" (body-self) regulatory information, from the cells to the brain. This stream of information is then integrated with the exteroceptive sensory modalities and complex memory systems (the mind-self), providing the top-down flow of information from the brain. As Candace Pert originally put it:

> "Peptides serve to weave the body's organs and systems into a single web that reacts to both internal and external environmental changes with complex, subtly orchestrated responses. Peptides are the sheet music containing the notes, phrases and rhythms that allow the orchestra—your body—to play as an integrated entity. And the music that results is the tone or feeling that you experience subjectively as your emotions." (Pert, 1998)

This leads us to an exploration of the complex interplay of different emotions.

Neuropeptides as Complex Molecules of Emotion

In complex big-brained humans with nuanced cultural and social self-identities, these internal emotion stimuli include the *neuropeptides* involved in rapid-pace neural communication (oxytocin, vasopressin, opioids, β-endorphin, growth hormone–releasing factor, etc.). These work in concert with *neurotransmitters* (glutamate, aspartate, dopamine, serotonin, histamine, GABA, epinephrine, melatonin, etc.) as well as the longer-lasting blood-borne *hormones* of the endocrine system (cortisol, adrenaline, testosterone, estrogen, growth hormones, insulin, etc.). Together these provide a capacity for rapid communication of emotional messages throughout the body. For proper functioning there needs to be a constant flow of feedback loops to optimize a balanced response. For instance, if there is a perception of a threat causing fear, one effect of these emotional communicators is to get the heart to beat faster. Were it not for negative blockers to mitigate the message, the heart would be faster and faster until it prompted a heart attack.

In terms of neural structures, the amygdala is arguably a central sensory organ for emotion. It works as a neuro-traffic controller for sense perceptions, either responding directly and quickly (if you touch something hot you withdraw your hand before feeling the heat), or sending them to the limbic system, or sending them to the cortex to sort out what they might be (Niehoff). Bidirectional information processing paths specific to emotion involve all three major structures of the vertebrate brain including the deepest homeostatic and regulatory functions of the brain stem (Peil 2014). There are also three corresponding control loops in the brain performing the original 3-step thermostatic regulatory cycle of comparison, signaling and response (Lewis, 2005). Likewise, the recent discovery of lymphatic vasculature in the brain (Louveau, et al. 2015) emphasizes the bidirectional communication pathways of the immune system, shedding light on the powerful placebo (Lidstone, de la Fuente-Fernandez, & Stoessl, 2005) and nocebo (Hahn, 1997; Beauregard 2007) effects of mind upon body. More, the same neuroconductors used for thinking control the immune and endocrine systems (Pert 1998). The central point is that the self, in all of its elegant physical, mental and social nuance, is fully integrated by our emotional chemistry and wholly represented within the informational content of the most complex feeling experiences available to the creature.

Indeed, in consonance with Vern Redekop's prior discussion of the seven chakras of the human body, they can loosely be divided into three sections, relating directly to the three imperatives within emotional self-regulation: Chakras one and two relate largely to bodily *self-preservatio*n; Chakras three and four (solar plexus and heart) relate to *self-development* of mind (including empathic expansion melding self and "other"); while Chakras five through seven relate to the highest manifestations of creative *self-actualization* of innate soul potentials.

Resolving Five Cartesian Mind-Body Conundrums

This new integrated view of the self fully resonates with the complexity view of the body as an emergent Kantian whole with hierarchally nested regulatory processes at each level of scale. It also remedies several problems left over from the Cartesian severance of mind from body. First, the depiction of mind as something detached, ghostly (and with no explainable causal influence) has given way to that of one physical *bodymind* functionally integrated and regulated by emotional signaling processes. We observe a "dual process" brain with bidirectional emotional pathways that integrate "explicit" (top-down; mindful, cognitive, perceptual) and "implicit" (bottom-up, interoceptive, genetic) dimensions of self-regulation (Gyurak, Gross & Etkin, 2011).

Second, in this new paradigm a functional "mind" is no longer unique to humans or even limited to brains. Instead, where there is hedonic behavior—emotional sentience—there is some form of crude mind. In fact, this new science builds upon the 4-E model of mind, originally set forth by Maturana & Varela (1980; Thompson, 2007). By this definition, the mind is fully *embodied* in an organism, but it is *enactive* as it is born of a continuous recursive feedback loop between the organism and its environment. It is *embedded* in the immediate features of that environment, and it is *extended* to the degree that the organism can expand the boundaries of is ecological niche. But the new emotion science adds a fifth E—*evaluative*—for the enactment and expansion of mind are driven by the *evaluative feedback* and *conditioned learning* that are delivered by the emotional sense. Congruent with this is the observation of moral psychologists (Haight and Hauser) that we are hardwired to learn moral imperatives, concerning what is forbidden, what is obligatory, and what is permitted, from infancy. We then make quick evaluative judgments based on what is in these three baskets. These judgments then guide our thought processes. In short, 5-E minds abound in even the simplest animate bodies, instantiated within the receptor complexes on the cell membranes of even the lowly bacterium.

Third, a biological fact reflected in the original Cartesian dualism concerns the plural nature of *functional identity*. In general, the "self-identity" that is regulated by the emotional sense functions as both an *individual* agent, and *part of a greater collective whole,* essentially maintaining a functional balance between an autonomous ("me") and a social ("we"). This dual functional identity emerged very early on, ushering *group selection,* and elevating the strategy of *cooperation* above individual competition (Nowak, 2006). Indeed, both autonomous agency and collective behavior are instantiated by the simple hedonic sensory circuitry of our little E coli bacterium (Peil, 2014) in a process known as *quorum sensing* (Bassler 1999). Utilizing the same hedonic sensory system (with only slightly fancier peptides), the bacterium can recognize and cooperate with other members of its species, collectively balling up in defense against antibacterial agents or mounting a virulent attack against a competing species—a "not-self other." While we think of bacteria as bad stuff, there is a vast ecosystem of commensal bacterial species living in and on the human body now known as the *microbiome*. In fact, there are three times as many bacterial cells as there are human cells, and recent discoveries suggest that their signaling processes influence human neurochemistry, brain function, emotional experiences, immune functioning, and epigenetic regulatory processes (Bale 2014; Jašarević, Rodgers, & Bale 2015).

The central point here is that the neo-Darwian evolutionary story overlooks a *collective identity*—both internal to the body and external in that we belong to collective entitites, that is deeply inherent in our autonomous functioning, adding far more self-regulatory nuance than the "selfish gene" (Dawkins, 1989) picture suggests.

Fourth, the Cartesian paradigm also deemed the ghostly mind to be the hero of higher reason—the lofty (perhaps even divine source) of moral virtue, and the body to be the lowly source of irrational emotion, animal urges and our least dignified behaviors. Neuroscience now suggests quite the opposite: That the body, via the ancient bottom-up aspects of the emotional sense, is actually the champion of truth, honesty, and integrity (Greene & Paxton 2009), while the mind is the ultimate source of arbitrary linguistic construction, rationalization, ego defense, personal bias, and self-deception (Kahnman & Tversky?) Behavioral economists too are increasingly aware of embodied emotion as the bottom-up driver of evaluative choice-making (Lerner, Small & Lowenstein, 2004), of social cooperation (DeSteno, et al 2010), and of the key role of trust in resolving economic social dilemmas (Arrow, 1974, Ostrom, 2009). In short, embodied hedonic values provide the ultimate Platonic ground for mindful—or mindlessly deficient—judgments of what is good, true, and beautiful (cf. reference to moral psychology above).

This brings us to a final Cartesian conundrum, one concerning the assumed causal relationship between emotion and "sinful" behavior (biologically defined herein as that which is personally or socially self-destructive). This turns on the fact that the *painful negative emotions* are more urgent and can sweep in and overwhelm our good feelings and cooperative impulses. But the confusion resolves readily once we factor in the evolutionary logic: For pain is about *self-preservation* of the *body* and *its autonomous self-identity,* while pleasure concerns *self-development* of the *mind* and expansion of the *social self-identity*—the group(s) to which one belongs. In short, pleasure is to mind, development, and sociality as pain is to body, preservation, and individualism. As intimate informational counterparts, good and bad feelings play different yet equally important roles in integrating and balancing the dual aspects of identity. There will be much more to say here, for this dual sense of organic identity is one of the key missing pieces that are required to help us understand the nature of justice, violence and the elegant wisdom of the heart.

ADDITIONAL LEVELS OF EMOTIONAL INFORMATION: FROM UNIVERSAL NEEDS TO PERSONAL BELIEFS

This is where we encounter the additional levels of information encoded in emotional sensory perception—those encoded in our basic and complex categories of feeling. Indeed, most of what we've covered so far concerns the basement level information encoded within pleasure and pain. Understanding the rest of the system relies on this foundation—a game changer that we still have yet to embrace. Despite all the nuances of the self, raw pleasure and pain still mediate the ancient evolutionary imperatives, and their informational message is simple and clear-cut: *Reduce* the environmental conditions that elicit bad feelings (for bodily self-preservation) and *increase* those that trigger good feelings (for mindful self-development). If creatures do this automatically and fairly regularly, restoring self-balance in the moment builds long-term memories, habits, and "instinctive" strategies that yield something like a 4/1 ratio of good to bad feelings in daily experience. But if we humans do it mindfully, deliberatively, and with full creative intention—by incorporating the other two levels of emotional sensory information – we can push that ratio far higher and be much happier and healthier.

Mining the second level of information is to access the meaning encoded in our *basic emotions*: feelings of *joy, sadness, anger, disgust,* and *fear*. Like primary colors, these basic emotions are relatively

hardwired, emerging within the first six months of life (Izard, 1971), and are reflected in common facial expressions across the human family (Eckman, 1993). Note that four out of these five basic feelings are painful feelings, which on the surface might seem to be an unfortunate evolutionary legacy. On the contrary, this is where the 4/1 ratio comes from, for nature is offering us *four times as much* specific information about how to preserve the body. These basic distress signals tell us, universally, what bad stuff to avoid, which environmental conditions we should individually and collectively act to reduce, both locally and globally.

The information they offer is to be found in their "appraisal themes" (Smith & Lazarus 1993). The appraisal themes within the four basic distress signals are as follows: *Sadness* concerns *loss* (of need-meeting commodities and relationships, asking for corrections that replace and replenish); *fear* concerns *immediate danger* and *threat*s of bodily harm or loss (asking for avoidance or removal); *disgust* concerns *contamination* (bacterial overgrowth and unwholesome comestibles and conditions; asking for healthy cleanliness and purity); *anger* concerns *obstacles to agency* and *social violation* (asking for removal/reduction/alteration of obstacles and violators). These needs and feelings support the self-preservation of body, its autonomy and self-regulatory agency. In terms of the bi-directional self-organizing informational flows, they mandate the top-down coordination of global coherence and stability, constraining any excessive bottom-up chaotic change. On the other hand, beyond the peaceful pleasure of restored self-balance, the basic feeling of *joy* holds the appraisal of *novel opportunity* and *beneficial growth* (mentally and socially)—as our primary custodian of the self-developmental imperative. Joy is far more biologically fluid, culturally flexible and personally determined.

These basic emotions deliver the same messages for all of us. For as Lamarck suspected, their appraisal themes relate to the "felt needs" of the organism, the needs of all living systems to find food, warmth, fresh air and shelter, the needs that support physical self-preservation. These needs are reflected in motivational circuits of the mammalian brain—circuits for fear, rage, panic, seeking, lust, play, care (Panksepp, 2011) and disgust (Toronchuk, & Ellis, 2007). In humans, these physiological needs are enfolded within a set of six universal *psychological* human needs, direct cognitive extensions of all innate drives and life-giving regulatory processes. These six needs loosely parallel Abraham Maslow's needs hierarchy (Maslow, 1970), yet are prioritized generally around the two self-regulatory imperatives, with top-priority always given to the *self-preservationary imperative* via the *painful feelings*—which is why, emotionally, "bad is stronger than good" (Baumeister, 2001). In this scheme, the four basic negative emotions generally support the biologically non-negotiable needs for the autonomous *freedom* and *empowerment* to self-regulate—to engage in behaviors that restore and maintain emotional equilibrium, meeting ones needs in balanced ways over time while avoiding harm. (The basement needs for freedom and power, are loosely captured in the term *liberty*, a political value as well as a human right. They are also associated with the first two chakras.) Joy, on the other hand, is the eustress signal for new beneficial affordances, opportunities and learning experiences, supporting the second tier *self-developmental* imperative and the higher social and spiritual needs: These are the needs for *connection* (bonds with social others); for *self-esteem* (to productively contribute and earn one's place within the social world; associated with chakras three-five); for *creativity* (to offer new solutions to human problems and invent new need-meeting commodities or experiences), for *meaning* (to find/construct long-term personal purpose and spiritual significance from life events, and to actualize the best version of oneself; associated with chakras six and seven).

In sum, the basic emotions are informing us how best to preserve the body by changing the affordances of the landscape, while also building long-term schemata in the ever-developing mindscape. Together our eustress and distress signals teach us through ongoing cycles of trial and error, building

approach and avoid habits, attitudes and motives even before we are aware of the process. Once we understand the meaning of their appraisals, they inform us of our deepest non-negotiable needs, and the best ways of balancing them across time. They inform us of our resilience, teaching us to prioritize and juggle our needs in certain ways, even temporarily postponing some of our higher-tier needs in the short run should immediate self-preservation be required. They ask us to build the discipline to endure short-term pain, for which they reward us with the long-term pleasures of increasingly vibrant health, personal happiness, and social synergy.

The Third Level of Emotional Information

The final level of information contained in emotional sense is to be found in the *complex emotions*. Complex feelings are blends and shades of the basic emotions, carrying forth both deeper levels within them, they include the remaining feelings like trust, mistrust, admiration, envy, courage, anxiety, gratitude, contempt, love and hate, etc. Unlike their more hardwired primaries, however, they are forged over time (the first decade of a child's life), and they are unique to one's culture, language and personal experience—concerning the good or bad holdings of *individual mindscape*. They advise us of the nature, development state, and quality of our moral conscience. Their emergence is also heavily context dependent, highly sensitive to the good or bad structural affordances of the *social landscape* within which that 5E mind is continuously enacted. These complex feelings direct us to the optimal or deficient beliefs, attitudes and strategies, informing us of how well the lower levels of emotional information have been incorporated into our personal schematic knowledge as well as within the social structures of our environment. They have much to tell us about the right and wrong (optimal or deficient) human developmental trajectories (which we will discuss in detail). For now, whether positive or negative, all complex feelings serve the *self-developmental* imperative. They speak of the higher tiered needs, our social nature, our moral strategies and our empathic boundaries, spanning the mental, social and spiritual aspects of human identity. Perhaps at their deepest level they facilitate self-actualization of our innate potentials, whatever they may be.

THE PHYSICS OF SENTIENCE: DEEPER SOURCES OF EMOTIONAL VITALITY?

With the word *potential* we encounter facets of the emotional sense beyond the self/not-self, beyond the comparison body against its immediate world. Hints of our potentials are reflected in some of our most uniquely inspiring, intriguing, and perhaps even mystical experiences. Indeed, in humans, that ancient thermostatic loop seems to have an additional "not-yet-self" comparison at work as well, a measure against some innate identity component akin to a spiritual seed, or specific range of "soul" potential. Something that feels both preexisting and fully open-ended, and yet to be actualized, but with sufficient form to channel and focus our personal interests, inclinations, and explorations in some directions rather than others. The voice of this not-yet-self bubbles up from our core within our dreams and our most complex positive emotions, gently (yet insistently over time) in-forming us of our essential nature, our special gifts, and unique calling in life. It offers the deepest, most profound level of information—meaning that sweeps across the longest expanses of time, space, and self. I'll choose the word "soul" to describe it, and specify its "spiritual" imperative as *self-actualization*.

This soul may be simply another emergent facet of our bodily chemistry and our genetic regulation, part of our cellular differentiation and morphological developmental processes that we have yet to understand. Or, as religions suggest, it might be something more essential, like an enduring spirit, perhaps our immanent connection to any transcendent creative force, unified mind, or "divine love" in the universe. Science may never provide answers to questions posed by these deepest experiences. But

the ontological source or "cause" does not necessarily matter, for its informative effects are ours for the taking. And to acknowledge its gentle abiding voice (as distinct from either mind or body) is to embrace the fully self-actualizing dimension within our emotional guidance. So let's quickly recap and delve a little deeper.

Chemical robots or sentient agents?

Thus far, I have described the underpinnings of emotional sentience as an elegant molecular machine, with chemical sensory stimulus acting upon the fully distributed sensory organ, the entire physical structure of the creature. Special focus has fallen upon the protein receptor complexes on the cellular membranes, the inaugural sensory organs in living systems, still in place mediating the emotional sensory network at the cellular level. This mechanism yields empirically observable self-regulated (hedonic) behavior in all animate creatures, and it is compatible with the laws of thermodynamics and classical physics. Still, a hard line physicalist might suggest this evidences nothing more than a genetically determined robot, without any genuine experience, creative choice-making or goal-seeking. This implies that we humans too are brain-driven deterministic machines devoid of free will, and duped by its illusion (Dennett, 2004; Harris). A slightly more generous line of thinking is that complex experience and "compatible free will" are emergent processes of a self-organizing body with a "self-governing" human brain (Ismael, 2015). Either way, the self emerges and stops at the classically physical mindbody, without any more fundamental or preexisting aspects of self-identity.

The richer and more likely story argued here, however, is that genuine sentience is commensurate with life itself; that both awareness and information processing are in fact occurring even in the simplest bacterium, and that the binary categories of pleasure and pain are central to intelligence in the system. Unlike the robot (programed with internal algorithms and behavioral rules), the living creature's internal sensory chemistry operates in direct response to *external* physical circumstances, via its 5E mind, perhaps in ways our physicists have not yet considered. In fact, in Gibson's theory of affordances, creatures can actually *see* the good or bad affordances of their immediate environment, they are "visually accessible" (Gibson, 1979). What might this mean in creatures who clearly respond to beneficial or harmful affordances but without any eyes or brains?

Quantum Biology: Light as Sensory Stimulus

It means simply that the foundational sensory stimulus includes *electromagnetic energy*—light! Indeed, even our little E. coli bacterium can sense and respond to changes in electromagnetic fields (Peil, 2014) and ultimately, all of organic chemistry is dependent upon the smaller scale *quantum behavior* of electrons (fermions) and photons (bosons). While it has long been thought that living structures are too warm, wet, and noisy to be effected by quantum processes, they have been found in photosynthetic light harvesting in plants, in bird navigation, and in the sense of smell (Lambert et al 2015). As a deeper level candidate for emotional stimulus (the sensory key to initiate computations, the functional "locks" in the cellular receptor complexes) electromagnetic fields have physical binaries (positive and negative charge, magnetic attraction and repulsion, constructive and destructive interference, etc.), that might mechanistically bridge the binary feedback motifs with the higher binaries of pleasure and pain. Likewise, the dual particle/wave nature of matter may be instructive of the part-whole nature of the self, and shed light on our feelings that seem to imply any deeper vital—soul—essence.

For example, both sensory stimulus and environmental medium for emotional sensory signals might include what are becoming known as *biofields* (Kafatos et al. 2015). While still speculative, these

fields are described as structures in space and time that extend outward from a material object; they are electrometric in nature, but exhibit quantum-like properties that foster communication, cooperation, and coherence across multiple levels of self-organizing systems. A biofield is "a field of energy and information both putative and subtle that *regulates* the *homeodynamic function* in living organisms and may play a substantial role in understanding and guiding health processes" (Ibid; emphasis mine.) While the concept of the biofield has long been missing from our theoretical models, it might simply reflect a quantum level of electromagnetic activity that has long undergirded our biochemical reactivity, adaptivity, and complexity. They would afford the type of biological regulation for the system to "respond to perturbations, modulating its own constitutive dynamics in response to particular changes in external or internal conditions" (Bich, et al. 2015), precisely what we observe in hedonic behavior. And while supported by sound physical science, biofields also capture the old ideas of an animating spirit, an aura, or some sort of energy body that surrounds the living system – or the chakra energy vortexes. Perhaps biofields describe how a material object—as both a particle and wave—can observe, define, and subjectively interact with itself, in local, nonlocal, and perhaps even efficaciously creative ways.

Quantum Observation as Sentience?

Indeed, once we take genuine sentience seriously and trace it to this deeper quantum core, we encounter "subjectivity" itself. In the classical world, chemical stimulus-response sentience does the job, but its required *comparison* between self and not-self tacitly assumes some deeper subjective capacity. This confronts us with the hard problem of *consciousness*—defined herein as the *fundamental capacity to observe*; this includes a capacity for self-observation. We also encounter the enigmatic role of the "observer" in quantum mechanics. While there is no subjectivity in our (methodologically "objective") scientific models, the fundamental observation has long been associated with the "measurement" process, that which collapses myriad quantum "potentia"—many super positioned possibilities—into any one classically actual event within our experienced reality. I'll mention here that while considered among the most well-tested and predictively accurate of all theories, quantum mechanics remains incompatible with our best understanding of the structure of space-time (the theory of general relativity), and purely objective efforts to unite them (e.g. string theory) have encountered significant problems (Smolin 2007). While it is an open question what an understanding of consciousness may do to our understanding of the universe and our place within it, factoring in a possible role for subjectivity—should we consider space-time-*and self* (as a relative subjective center of experience)—opens some new potential explanations for the nuances of our richest, most meaningful, emotional experiences.

Quantum Models of Consciousness

Some theorists have turned to quantum mechanics for understandings of consciousness, with or without pre-existing subjectivity, and with either material or nonmaterial versions of a *panpsychic* universe—the idea that consciousness is inherent in the dynamics of the universe. In the Penrose Hameroff model, for example, consciousness occurs "objectively" in a process where space-time splits into two or more possible configurations and then a gravitational "self-collapse" reduces those multiple super-positioned possibilities into one classical event. Called *orchestrated objective reduction*, this process constitutes the measurement event, giving rise to flashes of consciousness and pleasurable feeling qualia (Hameroff, 2012; 2015), flashes that are then orchestrated into a rich experience of consciousness—perhaps the quantum underbelly of the aforementioned chemical orchestration instantiated by the molecules of emotion. This deeper orchestration is instantiated in *microtubules*, tubulin proteins present in all cellular structures, with binary behaviors (expansion or contraction) suitable for computational functions, behaviors that could instantiate the functional feedback dynamics accomplished on the cellular

receptor complexes (Peil, 2014). In this model, any sort of "vital soul" would be these fully embodied moment-to-moment flashes of quantum consciousness, rather than something preexisting. The value system the feeling qualia imply (preference for goodness) however, are enduring, mathematically embedded as "Platonic values" in spacetime itself (Hameroff, 2015).

In another view, Stuart Kauffman (2016) posits an interactive dualism between the quantum scale ("Res potentia"—a dimension of ontologically real "possibles") and our classical domain of actual experience ("Res extensa"). The interactions between them are transformative and autocatalytic, occuring in an overlapping "poised realm" (with actuals creating new possibles and new possibles creating new actuals), mediated "acausally" and "nonlocally" by "mind" (Kauffman, 2011, 2014, 2015). In this view, mind is something akin to the fundamental capacity to observe, to measure, and collapse the possibles into actuals, as part of the self-organizing creativity of the universe.

While neither model explicitly suggests any pre-existing, local, experiencing subject, to the degree that any "not-yet-self" comparisons can be made between actuals, super positioned possibilities and/or Platonic values, these models offer more fruitful explanations for our full range of feeling experience than the standard view. Most importantly, both acknowledge a physically creative role for consciousness—and preference—in the unfolding of large scale classical events. Indeed both models are compatible with the sort of "edge-of-chaos" preferential balancing we observe in emotional self-regulation, delivering the information to maintain optimal preservation of form despite ongoing chaotic change—as mediated by pain and pleasure. This fundamental self-regulatory dynamic balancing may also be the ultimate foundation for the mathematical (power law) pattern of edge-of-chaos criticality. A pattern that appears across physical and social systems, and has been posited as the source of computation—information processing— in nature (Langton 1990), and perhaps even a new type of information that can help explain the phenomenological experience of self, being, and time (Hankey 2015).

Other proposals for consciousness go further still, addressing the local, relative, and multidimensional aspects of the self, offering quantum explanations for not-yet-self comparisons as well as the part-whole identities evident in the self-regulatory machinery of all animate creatures. Whether they suggest consciousness to be material or nonmaterial, they root a self-observing subject within a time trajectory and postulate a fundamental *self-reflexivity*, a recursive feedback loop that cyclically updates—indeed cyclically *recreates*—the experiencing self (Peirce 1902; Theise and Kafatos, 2013; Peil-Kauffman, 2015). Within the non-materialist view, the foundational capacity to observe (perhaps a unified Self, with a capital S) exists as a single "monistic awareness," which begins to manifest (perceive) *the possibility of self and other*, via a "symmetry break" resulting in the dualistic phenomenal universe and "the emanation of space-time, matter and energy" (Theise and Kafatos 2013; 2015). Such an ongoing symmetry breaking process would give rise to myriad self/not-self partitions and sub-partitions within the unified Self, the relative boundary conditions then mediated locally by a common self-regulatory logic. Such models are compatible with the dual wave/particle nature of matter and the geometric and functional specifics of regulatory biofields (Kafatos et al. 2015), and in honoring the self as a subjective and active center, they do more justice to the creative, self-organizing, dynamics of the universe—as well as to the most meaningful human feelings.

A more materialist view proposes something akin to little "self-units" at the Plank scale – what Neil Theise discusses as the first "things" popping in and out of existence within the quantum foam. Like the Leibnitzian monad (the smallest units of matter – with both awareness and desire (Liebnitz, 1710) for example, yet able to interact, assemble, and reassemble in perhaps infinite ways—the self-aware, self-determining, building blocks in a self-organizing universe. Such a view resonates with the image of Indra's

Net from the Hindu tradition, an elegant, multi-dimensional, web work of interconnected nodes of consciousness—self units defining and entangling themselves in ever new and creative ways, within a potentially infinite network. I would add to this image the common pattern of edge-of-chaos dynamism, wherein each monad (or self-unit) behaves—self-regulates—in ways that maintain its physical stability (its particle nature) despite also engaging in ongoing transformation and creative change (its wave nature). This would involve a *common self-regulatory code*, a universal if-then (tit-for-tat) algorithmic code (Peil, 2012), one rooted within the observable binary opposites in the physical forces, apparent within feedback and attractor dynamics of networks, and giving rise to the higher level hedonic pattern in living systems. Such a code would effectively instantiate bidirectional information flows, functionally orienting both horizontal (outside in/ inside out) and vertical (top down/bottom up) perspectives and informational flows—a fractal self-organizing structure akin to a set of Russian Nesting Dolls (Peil-Kauffman, 2015). Were this to be the case, the self-regulated behavior itself would come first—before physical life even emerged, a living self-organizing dynamism defining the relational structures in space and time. Yet each node might also carry quantum vestiges—informative memories—of actual experiences, yielding the sort of durable informative and accurate database depicted in the ideas as the Akashic Record, the Platonic Realm of perfect forms, or the omniscience of Universal Mind.

Either way, such offerings accommodate part-whole *gestalts of consciousness* potentially varying across time and space. These would be the personalized and relativized yet nonlocally unified aspects of identity emotionally resonant within such terms as "higher self," inner psyche, spirit, soul, or even collective soul. They would also help explain genetically encoded "instinctive" or otherwise intelligent animal behavior—nonlocal empathic resonances, alternative foci or states of consciousness (including REM dreaming), or various other yet-unknown sensory modalities across the animal kingdom. In humans, such gestalts would shed light on our transpersonal, anomalous, and mystical (if not psychotically disorganized) experiences, those that often defy our standard explanations and boundaries of time, space, and self—but that are central to stories of religious revelation, spiritual enlightenment, and human redemption. They might also honor Carl Jung's proposal of the human collective unconscious, providing a functional substrate for paranormal (telepathic, precognitive, out-of-body or near-death) experiences, the more free-ranging even mystical aspects of dreamtime consciousness, and even spiritually transcendent, enlightened states of consciousness inspired by contemplative practice—the oceanic One-ness with any immanent creator "God," or All That Is, revelatory communion with an Ultimate Observing Self. Such gestalts could provide the deepest foundational source of any not-yet-self comparisons that whisper within our most complex positive emotions. Indeed, in most of these models, whether implicit or explicit, *emotion* is also present. Leibnitz's description of the monad, for example, was a self-unit endowed with both perception and desire (Leibnitz, 1710). Similarly, Albert North Whitehead described an "evaluative patterning," with self-units as "actual occasions" and "prehensions"—"feelings with elements of identity and contrast"… feelings with "self-interest, self-valuation, an emotional tone" (Whitehead 1927).

In sum, if fundamental subjectivity—the concept of self as a relative center of experience—might be required to physically reconcile the realm of the very small with the classical "relativity" of space-time, it would suggest that the ubiquitous ability of an organism to sense, perceive, or otherwise sample its environment might be at its deeper core an active extension of its *capacity to measure* or *observe*. It would roll back the first "E" of the 5E mind to the very "enactment" of collapsing particular quantum possibilities into classically actual events—its direct participation in the creative process itself. This would add a deeply literal dimension to the notion of creative *self-actualization*—a personally enactive, interactive, observational dance of preferentially shifting and selecting adjacent possibles into here and

now actuals. Indeed, should subjectivity turn out to be relevant in physics, it would root teleological self-actualization in the basement of physical animation, rather than in the attic of complex human experience.

Perhaps most importantly, it would also root the fifth E—*evaluation*—in the deeper directional flows and dynamics of the universe, in the attraction and repulsion in forces and fields, and merge with the language of fitness landscapes in the complexity sciences. Yet is would render evaluation to be a function of intrinsic desire and any degree of compatible free will any given self is deterministically apportioned. It would also merge with the language of Platonic values, how the good and the true are inherent within the esthetically beautiful mathematical order of the universe – the classical view of "natural law" (See Delicata, this volume, whose conclusions are in agreement with our emotional biology). It would flow forward into the classical Aristotelian virtue ethics via the common emotional valence, wherein consonant and dissonant feelings undergird our intuitions of right and wrong at both individual and social levels. Indeed, emotional conflict within the self-system (intrapersonal dissonance), is the ultimate source of all interpersonal, group level emotional dynamics of: emotional contagion, emotional conflict, emotional manipulation, and dehumanizing emotional violence. In short, no matter how deep it may prove to go, understanding the biological value system that is inherent in our emotional sense can inform both ethical theory and constructive theology in new and unifying ways.

IMPLICATIONS FOR SPIRITUALITY

Accordingly, a central and necessary reinterpretation concerns *spirituality.* Although the word is generally associated with religious ideologies and practices, through this new lens it is defined more narrowly, as a common *variety of human experience*, as William James once described it (James 1985). The claim here is that all of the great religious traditions as well as secular, humanistic, naturalistic, and Unitarian forms of personal practice tap into these common "spiritual" impulses and experiences—our *natural spirituality*. Our natural spirituality is the source of the most sacred experiences of human being, and the context of any enduring existence beyond the earthly life. It moves us to build and maintain a connection with something "greater than the self" in honor of our relational aspects of identity, as well as to create and express the personal capacities that make us a unique individual soul. It is the seat of our moral conscience, our impulses to be and do the best we can, and concerns building some strategy and daily practice to guide and manifest these impulses.

Our Emotional Vitalism

In our old religious stories, *the spirit* was considered to be a supernatural force aligned with the soul or with God, all which were ultimately rejected in light of post-Newtonian mechanistic paradigms. In the old vitalistic paradigm, however, the spirit was defined as the animating, guiding, and vitalizing principle, the *elan vitale* (Bergson, 1927), that was held to give life to physical organisms and to play the role of Aristotelian "entelechy" (Von Bertalanffy, 1972) in evolution. In our now postmodern, complex systems view, the biophysical mechanism that delivers these animating and vitalizing functions, as well as our direct spiritual experiences, is the *emotional self-regulatory sense.* In other words, our natural spirituality is undergirded by our common biology of emotion, the foundational reservoir of embodied emotional processes that unite and integrate the mind and body, honor and encourage our deepest potentials and capacities, and serve as the motive force that moves, guides, and inspires us to live the fullest, most meaningful and blissfully rewarding life. In short, in our new story, the stream of self-regulatory information offered by the emotional sense is itself the *innate voice of spirit* (Peil 2012).

Our natural spirituality also concerns what seem to be the most serendipitous aspects of life, the portentous coincidences, sacred friendships, and lucky events that befall us—the source of providence, and our blessed good fortune. It is also the source of our deepest challenges, our cursed calamities, and the most devastating dark nights of the soul. But in this new view, we are not at the mercy of divine or evil causal agents behind the scenes nor are random determined victims of physical laws, for we are all *contributing co-creators*.[3] We are willfully and mindfully empowered, active participants within the ongoing creative process, with our daily thoughts and actions calling forth certain – hopefully desirable - experiences from the adjacent possible. With the application of our consciousness and habitual behaviors, we are shaping our own fortunes *as well as those of one another* in the ongoing co-creative adventure. Our emotional sense calls us to not only acknowledge, honor and embrace our creative power, but to mindfully harness it and actualize our immense but latent co-creative potentials as a species.

Our Emotional Unity

Indeed, our natural spirituality tells us that we are *one human family,* biologically, ecologically and spiritually *undivided,* if not ultimately unified at the deepest levels of Self-identity. For despite the myriad faces of humanity, our emotional guidance assures us unequivocally that we are each *equally empowered* as co-creators; that despite the potential pitfalls of the self-regulatory process, we are each worthy of equal human *dignity* and the deepest *respect* as unique individuals. For despite whatever body, race, gender, socioeconomic status, or religious affiliation into which we might be born, we each arrive with distinct creative gifts to deliver, wholly irreplaceable genetic and quantum potentials to develop and express—if not "sacred contracts" to fulfill (Myss 2003). Our naturalistic spirituality tells us that our power comes with both universal human rights and non-negotiable human responsibilities at both individual and social levels. Understanding, and taking accountability for our creative power, both individually and en mass, is the central calling of the innate spiritual impulses.

The challenge now, at this hinge of history (Cahill, 2010; Kauffman 2016) is to reinvent a shared sense of the sacred (Kauffman 2008) informed by our best science. To acknowledge and honor our natural spirituality as a foundational substrate upon which our cultural and religious diversity can coexist, weave together, and blossom. To, for the first time in human history, transcend the limited identity boundaries that invite entrenched conflict, to equitably honor one another and all living systems; to enhance, and share the sacred biosphere that sustains us all. These are the callings of the human spirit that are accompanied by specific guidance that we have long ignored. These are the common callings of the heart, to universally cultivate and practice the genuine respect, compassion, forgiveness and devotion that we each desire for ourselves. Best of all they are callings that have long been mired in misconceptions about human nature and our dual identity, callings distorted by our notions of otherness, of sin and evil, thwarted by our external regulatory authorities and institutions that deny our non-negotiable self-regulatory nature—all born of our lack of understanding the biological function of emotion.

GOOD AND EVIL: A NEW INTERPRETATION OF GENESIS

[3] Note the links made to co-creation in Stuart Kauffman's chapter from the perspective of emergent creativity and Sandor Goodhart's chapter on Genesis, each coming at this from different perspectives.

Armed now with the understandings of the dual nature of identity, the dual self-regulatory imperatives, and our innate spirituality, we can shed new light upon the ultimate evaluative dichotomy; that of *good and evil.* While our new evaluative lexicon can ground the words good, bad, right and wrong (see follow-up chapter in Volume 2), there is no room in this scientific picture for the notion of "evil." For if we are to follow the strand of all so-called evil behavior to its biophysical core, we find instead the core duality of self/Self, of unresolved conflict between individual/social self-identity, of limited notions of "self" and "other," and of de-coherence between body and mind—all of which are evidenced by elicitation of the suite of complex negative emotions, the ongoing suffering of unresolved basic emotional distress. Nonetheless, many of our old identity stories remain rooted in Biblical lore, wherein good or bad values relate to good and evil forces, human nature is described as inherently flawed, and must be contained by obedience to external authorities or cultural doctrine. We are presumed to be naturally tainted, fallen from divine grace due to original sin—our animal desires and disobedient misuse of free will.

This new science, however, can offer a new and more supportable interpretation of the time-honored Genesis story, one more accurate and respectful of our biological endowments and full human potentials. It ultimately matters not whether they've been designed by a creator God, are born of the creativity of a living universe, or simply emergent over eons of evolutionary time, they put a new spin on a deeply influential old story:

The first humans, Adam and Eve, lived in the Earthly paradise Eden, which was centered around the Tree of Life. The Tree of Life was symbolic of the elegant inter-workings of the whole of nature, with each living system an important part of the functional self-organizing whole of Creation. [Add to this Tree-of-Life metaphor the implications of quantum mechanics and Whiteheadian Panpsychism wherein God is Consciousness Itself and the consciousness and desire of every living system, (and of every particle of matter) plays its own—quite literally—creative, self-actualizing, self-regulating, role in the emergence and ongoing co-creation of the universe.] And as the story goes, "God saw that it was good" (Holy Bible, 1952). All of the creation was good because all was in balanced alignment with the supreme Will of God—the Divine Self—the Creator of All That Is. And, it was all good because every living system possessed an *innate guidance system*, with good and bad feelings that related to naturally right and wrong states of being and becoming—God's divine value system speaking from within. Living systems were not only endowed with creative awareness and free will, but with a *directional emotional desire that advised us how to use it optimally*—how to rightly participate in the Grand Creation.

The "Fall," then, was not due to disobedience, the giving in to the temptations of evil—the eating of the forbidden fruit. For this forbidden fruit was not from the Tree of Life, but from the *Tree of Knowledge*. The forbidden fruit concerned very specific knowledge, the knowledge of *good and evil*. The specific directive was "You may freely eat of every tree in the garden, but of the tree of knowledge of good and evil you shall not eat, for in the day you eat of it, you shall die" (Genesis 2:15). Through this new scientific lens, this original mistake—the fall of humankind—was due to the invention of the *human knowledge* of good and evil, a social and linguistic construction that severed us from the divine, innate guidance of our emotional value system.

This was indeed a Fall of Biblical proportion, for the loss of our universal evaluative code effectively cut us off from the full riches of the Tree of Life. It severed our divine moral tether, our direct phenomenological experience of nature's value system, the unequivocal nonnegotiable inner evaluative authority, the only legitimate guidance for the right use of free will. This left us blind to our very power as physically creative self-regulatory agents. It left us mystified by and unaccountable for our own

misguided and often self-destructive creations, yet blaming the straw scapegoat of "evil." It left us in a compromised state of anxious child-like dependence upon would-be external authorities of every ilk. This was the *wrong* sort of shift in thought, as echoed by the subsequent emotional distress signals that would follow. For as the story goes, at that earth-shattering moment, we felt the first *shame* and *fear* of God, and were cursed with the pain and suffering, and of "eating of it the rest of your life" (Genesis 3:13-17)—a distressing self-destructive path that does indeed hasten physical decline and death.

In short, this new science suggests that the good and evil dichotomy is a false dichotomy, a human construction rooted in misunderstandings of the biological function of the emotional system, the dual nature of self, and the dual self-regulatory purposes. In fact, the entire regime of complex negative emotions—mistrust, self-doubt, shame, resentment, contempt, envy, rage, hate—are *delivering corrective information about our limited and misguided beliefs* and sociocultural constructions. We have been wrong and misguided, we have been ignorant and self-deceptive, we have blamed, shamed and manipulated one another, and we have misused our creativity, even stunting our own development. But we have never been evil. And we shall see in part two, the concept of evil itself is violent. It is almost universally utilized to dehumanize "the other"—those we choose to exclude from the singular family of humankind, those from which we distance ourselves with contrived—yet biologically false—identity boundaries, and those from which we withhold our innately expanding empathy and compassion. The concept of evil is also used to justify and maintain the wrong sorts of ideologies, socio-economic dynamics, dominance hierarchies, and power structures that in fact disempower individuals and stifle optimal human development. It is also used to "normalize" the entire suite of complex negative emotional signals, ongoing feelings of terror, shame, mistrust, resentment, envy, contempt and hate—even pressing them into service in order to dominate, control, or disempower one another.

And while our old stories completely miss the biological messages within emotion, they wholly blame the messenger. Indeed, of the "seven deadly sins" of the Western religious traditions, five are emotions themselves (pride, lust, envy, wrath, greed) and the rest are the predictable behavioral deficiencies of dysfunctional self-regulation (sloth, gluttony). From the Eastern traditions our negative emotions have been deemed "destructive" (Goleman, 2004), with our basic hedonic—selfish—craving and aversion suggested as the source of all suffering. Across most religious traditions "selfishness" is thought to be morally depraved and a martyred "selflessness" to be virtuous, yet both extremes are biologically self-destructive. And both extremes predictably trigger their own unique complex emotional corrective signals. Of course, over time, lingering distress signals are physically destructive. For they are chemical signals (gross overuses of the stress hormone cortisol) that are informing us of on-going dysregulation within the self-system, including the physical inflammation of immune response. But when answered promptly and consistently, there is tremendous flexibility and resilience in the emotional system, with plenty of room for the trial and error nature of learning, the reversal of personal and social missteps, and even the long-term healing of the compromised physical and social bodies. The problem is the apportionment of blame—blaming the emotional messenger, blaming the self, blaming the other, blaming original sin or evil forces. To blame is to mistakenly confound causes and effects. To blame is to deny our own free will, our creative capacities, our innate guidance and goodness – as Sandor Goodhart puts is our holy "ethical answerability" (Goodhart, this volume). Indeed, conversely, divine credit is also apportioned to supernatural deities for the mental and behavioral virtues delivered by the True North positive emotional dimension—agape love, gratitude, and humanitarian compassion.

This is why all roads of ethical and theological inquiry lead back to emotion—why the heart is both blamed and credited for the worst and best aspects of human nature. But we now have in hand, for the first time in human history, the opportunity to reclaim and honor our innate emotional guidance; the

opportunity to reinterpret the very concepts of violence, justice, power, value and human purpose, perhaps in ways that can foster the species-wide cooperation that has historically eluded us and engender a level of enlightened creativity that we have not yet imagined.

CONCLUSION

I hope to have offered a first step toward this sane, brave and honorable new world: A more accurate picture of our humanity, one that turns on understanding the full biological sweep and functional meaning of what we experience as human emotion. This is the core source of the intuitive wisdom of the heart, but long missing from even our best science leaving a gaping hole in our self-understanding.

Pouring the new emotion biology into this gap creates and expands myriad tributaries between many formerly isolated and disjointed rivers of empirical and theoretical academic wisdom, coming together into interdisciplinary pool—with a wellspring of information about natural values bubbling forth and rippling across much of what we think we know. It changes our view of the self, reconciling the Cartesian severance between mind and body and honoring both the individual and social aspects of personal identity. It allows us to enhance and unite Darwinian and Lamarckian evolutionary theory and to honor our active participation in natural selection, while hinting of a deeper physical dynamism and subjectivity that casts us as powerfully co-creative agents in participatory universe. It allows us to rethink our evaluative language, to root our ethics in the realm of public health, as it illuminates a rudimentary "right track" of human development (one that our behavior and social institutions can impact in good or bad ways), as well as a universal natural spirituality that can help unite us in our now global community. It challenges us to reexamine such time-honored ideas as sin and evil—finding best evidence of an innate and empathic goodness, a deep physical and spiritual unity, and a species pregnant with unrealized creative potential. It honors us as "noble savages" (Rousseau, 1987) innately cooperative, kind, empathic, and rightly guided from within. Yet it also informs us that we are hardwired with autopilot self-preservationary fight and flight reactions to our painful emotions, those that—until fully understood—can limit us to the selfish, competitive, and self-destructive behaviors of Hobbesian brutes (Hobbes, 1651). Such knee-jerk behaviors are old news to be sure, but the new science allows us to examine them within their self-regulatory functional context, and to note that our emotional guidance suggests they are optimal only after the other right responses—learning and communication—have been exhausted.

My chapter in Volume two will explore how the positive and negative emotions work together, allowing us to revisit morality and redefine the concepts of violation and justice accordingly. We will see how and why approaches that enable optimal self-regulation rather than simply punish, blame or constrain are most likely to succeed. For they will be those that implicitly rely upon and harness the complex positive emotional dimension, while honoring and addressing our basic universal pains. Come join us on the final leg of this journey.

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