

## FIS: Emotional Sentience: Author Response 2 (Specific)

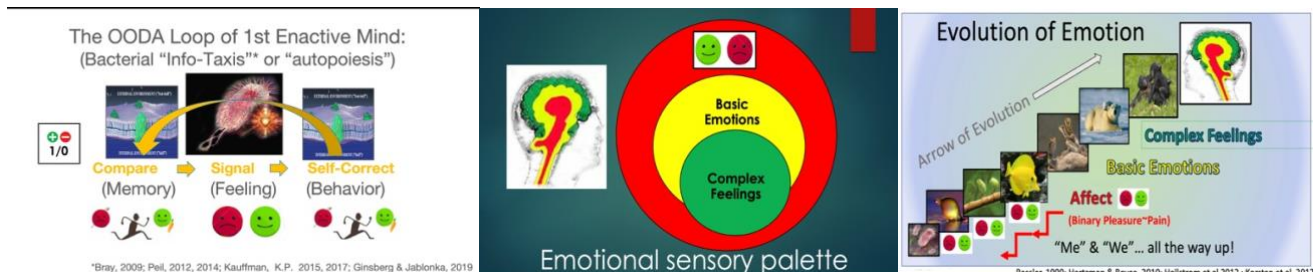
Katherine Peil Kauffman

April 17, 2024

Dear FIS Community,

Since I'm still working on my official general response (which introduces my Tao metaphor), today I'll to address the individual questions that have arisen. Since a picture can be worth many words, I'll attach some slides from various talks I've given (most of which can be found here: <http://www.emotionalsentience.com/talks.php> for those with sufficient time and curiosity.)

**Eric:** Great comments – to both me and Stu! Allow me to offer some missing context: In point 4 of my original offering, I mentioned that binary hedonic qualia provided both a *signal* and a *corrective* response in what is actually a 4-Step Cybernetic loop, driven by a coupling of positive (amplifying) and negative (homeostatic) *feedback control*. The steps are: 1) a *comparison* is made between *internal self-states* (needs) and external environmental conditions (affordances); 2) When imbalances are detected a *signal* is sent that triggers a 3) self-correcting *behavior* (approach or avoidant; stimulus increase or decrease) to rebalance the system. Then, the binary information from the response is fed-back into autobiographic *memory*, so-as to *feed-forward*, newly inform intention, and motivate the next iterative cycle. All of this is evident in the sensori-motor chemistry of the bacterium, but the original *comparison* requires an exploration into consciousness, information, and identity potentials. (My Tao story will cover this.) But this original enactive, 5E “loop of mind” is driven by hedonic qualia at each step (Pic at left); it shows up later on as the *perception-action-cycle*, and what in military strategy Boyd calls the *OODA loop* – how humans Observe, Orient, Decide, and Act. Pics 2 and 3 offer a quick visual to explain why the binaries at the bottom are so important to understanding the two higher levels of information in emotion. (The middle figure, relates emotion categories to the triune structure of the vertebrate brain: while the last shows where they appear on the evolutionary trajectory.)

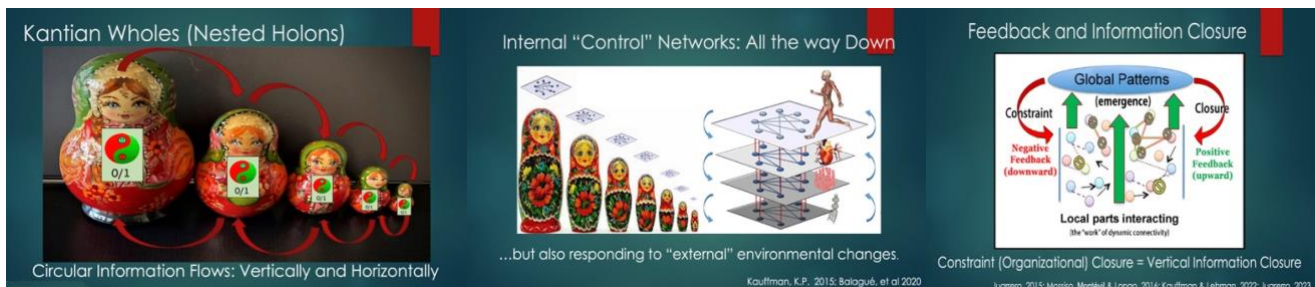


**Joe:** My Tao story will address your issues, and hopefully elucidate the confluence between our approaches to binary and fuzzy logic, and the roles of analog and digital information – both of

which are born of the feedback coupling mentioned above. (There is also a story here about membrane polarization and voltage from Mike Levin's work that yields both restores homeodynamic balance in the "part" and phase locking – syncing into collective "wholes" - as an aspect of the negative feedback response. See my answer to Christophe below.)

**Karl:** My Tao story will provide the language of 1s and 0s engineers – as well as those that inform our dualistic experiences of the world. I'll also use the terms hardware and software to distinguish mechanical behavioral programs from those that involve information processing and decision making. In terms of Freud, his triad of Id, Ego, and Superego can be laundered and updated with clarity on the three informational levels within complex human feelings. I hope to hear what you mean by "liaison values" and draw upon your mathematical wisdom as it concerns sequential trajectories, geometry, topology, and conjugate variables.

**Christophe:** Your point about *constraints* (in both measurement and satisfaction) strikes deeply at the conceptual core of complex self-organizing systems. This is the concept of cyclic or circular "closure" (variously known as operational, organizational or constraint closure), but to my mind is better understood as *informational* closure. This closure is central to what Stu calls the *Kantian Wholes* that distinguish non-life from life, how autonomous agency arises from the orderly dance between parts and wholes in nested networks, and how "simple rules" and nearest neighbor information give rise to global collective behavior. The feedback coupling I mentioned above forms a circular bi-directional self-regulatory closure that Hofstadter called the "strange loop" that yields the self-reflexive "I" of identity. Understanding this specific structure, its fluid boundaries, and its fractal *self-similarity* at every level of scale in time and space is required to make sense of such arbitrary terms as *bottom-up* (+ feedback amplification) and *top-down* (- feedback homeostasis), as well as biologically relative) distinctions that contrast and balance *internal(self)* and *external(not-self)* environments. Here is a quick visual using the image of Russian Nesting Dolls (with apologies to my Ukrainian friends). Note the primacy of how each doll is looking out upon and responding to changes in its *local* environment, yet also synchronizing with its relative upper and lower dolls for whole-body self-regulation. This is accomplished at each level via hedonic qualia, with sensory stimulus born of both bioelectricity, chemical ligand receptor signaling (and likely entropic heat flows). Also shown, the internal dynamics at each level, and the coupling of positive and negative feedback functions that undergirds hedonic qualia.



**Pedro:** My best wishes for the finest possible outcome on family health challenges. Your clever question about the Daniels – Goleman and Kahneman – reflect your deep study of my work, thank you. So, first, I was thrilled when Daniel Goleman unleashed the idea of *Emotional Intelligence* and *EQ* upon the scene in the late 90s, although Peter Salovey had coined the term nearly a decade earlier (perhaps the first to say something good about emotion). While he called great attention to the emotional system and inspired many useful applications, in terms of theory, emotional sentience and its self-regulatory value system remains confounded within labels of *social cognition*, *intuition* (as heuristic only), *cognitive bias* and *behavioral* (if not genetic) determinism. This brings us to the last great Nobel laureate Daniel Kahneman, who popularized *the Two Systems – “fast and slow” Dual Process – view of cognition*. One is *quick, dirty and instinctive via older brain regions (limbic and thalamic brainstem structures)*, and one *other slow, rational, and deliberate via the newest prefrontal context where complex language and schemata abide*. The problem I (and affective neuroscientists) have is that cognition proper and emotional affect remain confounded. While still utilized extensively, this model fails to distinguish the stream of “cognitive computations” (LeDoux’s “thoughts that lead to other thoughts”) from the deeper – and more primal - emotional stream of “affective computations” – computations that always “concern *the self* and *lead to action*”. Part of the problem is the common assumptions that self-awareness is linked to language, that evaluative appraisals come from the top down, and emotion and motivation are separate systems while both have always served sensory-motor control. (E-motion, *emovere* implies action!) Instead, Damasio roots emotion and the “proto self” awareness in the somatic markers and regulatory activity of the body. Indeed, Damasio’s book *The Feeling of What Happens* came out around the same time as Goleman’s *Emotional Intelligence* as well as Candace Pert’s *Molecules of Emotion* – all of which inspired my own deeper dive into the biology of emotion. Hopefully my Tao story will help cast Dual Process theory in a difference more informative light.

I’ll stop for now, planning to have my official *general response* to you before the week is out.

With gratitude,

Kate Kauffman